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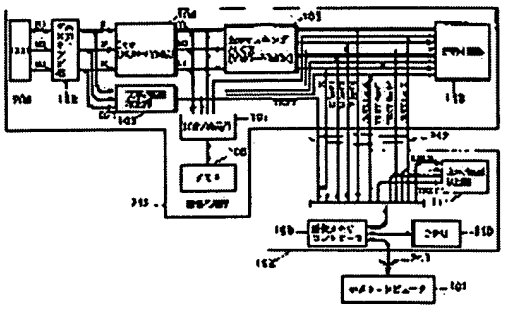
(54) IMAGE PROCESSING UNIT AND ITS METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an output of an image at a high speed by reading an image signal and a characteristic signal so as to compensate the deterioration in the resolution of a character/line drawing in the case of emphasizing gradation and so as to compensate the deterioration in the gradation of the character/ line drawing in the case of emphasizing resolution because no adaptive processing is applied to the image entered from an external device and the gradation and the resolution on an entire output image are fixed.



SOLUTION: Upon receipt of an image signal from a host computer 101, a character/line drawing section 111 reads the image signal from an image memory 109 and generates a discrimination signal TEXT denoting whether or not a picture element forms a character/line drawing and stores the signal to the image memory 109. A PWM circuit 113 reads the image signal and its discrimination signal TEXT from the image memory 109 to revise PWM number of the image signal, based on the discrimination signal TEXT. Thus, a

monochromatic signal is generated from plural color component signals of a color image signal and a characteristic signal of each picture element of the color image is generated from the monochromatic signal.

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] A storage means to hold the inputted color picture signal, and a monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from said storage means, The image processing system characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.
[Claim 2] When said color picture signal is inputted as a storage means to hold the inputted color picture signal, from an external instrument, A monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from said storage means, The image processing system characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.
[Claim 3] Furthermore, the image processing system indicated by claim 1 or claim 2 characterized by having a conversion means to change the outputted color picture signal into a record signal, based on the description signal outputted from said output means.
[Claim 4] Said conversion means is the image processing system indicated by any of claim 1 to claim 3 characterized by changing into the record signal which thought as important the record signal or gradation nature which thought resolution as important for said color picture signal based on said description signal they are.
[Claim 5] Said description signal is the image processing system indicated by any of claim 1 to claim 3 characterized by meaning whether each pixel constitutes an alphabetic character/line drawing they are.
[Claim 6] It is the image processing system indicated by claim 5 characterized by changing the color picture signal of a pixel with which said conversion means constitutes said alphabetic character/line drawing based on said description signal into the record signal which thought resolution as important, and changing the color picture signal of the pixel which constitutes an alphabetic character / except said line drawing into the record signal which thought gradation nature as important.
[Claim 7] The image-processing approach characterized by to have with the output step which reads and outputs a color picture signal and its description signal from the monochrome signal generation step which generates a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from a storage means hold the inputted color picture signal, the feature-detection step which generate the description signal with which the description for every pixel of said color picture expresses from said monochrome signal, and store in said storage means, and said storage means.
[Claim 8] The monochrome signal generation step which generates a monochrome signal from two or

more color component signals which constitute read-out and its color picture signal for the color picture signal from a storage means to hold the color picture signal when a color picture signal is inputted from an external instrument, The image-processing approach characterized by having the output step which reads and outputs a picture signal and its description signal from the feature detection step which generates the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and is stored in said storage means, and said storage means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image processing system of the image processing system which operates also as a printer also as a copying machine, and its approach, concerning an image processing system and its approach.
[0002]
[Description of the Prior Art] These people have proposed the image formation equipment which consists of an image reading means to read an image and to change into a picture signal, a memory means to hold the acquired picture signal, and the image output section that outputs the held picture signal and which operates as a color copying machine.
[0003] Furthermore, after connecting above-mentioned image formation equipment and an above-mentioned host computer, rasterizing the color picture created with the host computer by the controller through a controller and holding in the memory inside a controller, these people have also proposed the system which is outputted with image formation equipment and which operates as a color printer. This system operates also as a color printer also as a color copying machine based on directions of an operator.
[0004] Furthermore, in case the copy output of the manuscript placed on the platen is carried out, the alphabetic character and the line drawing part have been recognized, these were reproduced with high resolution, and these people have proposed the copying machine which performs reappearance from which parts other than these attached greater importance than to resolution to gradation nature accommodative.
[0005]
[Problem(s) to be Solved by the Invention] However, there are the following troubles in the technique mentioned above. That is, in equipment and the system which were mentioned above, about the image inputted from external instruments, such as a computer, since adaptation processing which was mentioned above is not performed, the gradation nature and the resolution of an output image are immobilization on the whole image surface, when gradation nature is thought as important, the resolution of an alphabetic character / line drawing part becomes low, and when resolution is thought as important, the gradation nature of a gradation part cannot but become low.
[0006] This invention is for solving an above-mentioned problem, recognizes the description of the image inputted from the external instrument, and aims at offering the image processing system which can output an image accommodative according to the description, and its approach.
[0007]
[Means for Solving the Problem] This invention is equipped with the following configurations as a way stage which attains the aforementioned purpose.
[0008] A storage means to hold the color picture signal into which the image processing system concerning this invention was inputted, A monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color

picture signal for a color picture signal from said storage means, It is characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.

[0009] Moreover, when said color picture signal is inputted as a storage means to hold the inputted color picture signal, from an external instrument, A monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from said storage means, It is characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.

[0010] The monochrome signal generation step which generates a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from a storage means to hold the color picture signal into which the image-processing approach concerning this invention was inputted, The description signal with which the description for every pixel of said color picture is expressed from said monochrome signal is generated, and it is characterized by having with the output step which reads and outputs a color picture signal and its description signal from the feature detection step stored in said storage means, and said storage means.
[0011] When a color picture signal is inputted from an external instrument, the color picture signal from a storage means to hold the color picture signal Moreover, read-out, The monochrome signal generation step which generates a monochrome signal from two or more color component signals which constitute the color picture signal, The description signal with which the description for every pixel of said color picture is expressed from said monochrome signal is generated, and it is characterized by having the output step which reads and outputs a picture signal and its description signal from the feature detection step stored in said storage means, and said storage means.
[0012]
[Embodiment of the Invention] Hereafter, the image processing system of 1 operation gestalt concerning this invention is explained to a detail with reference to a drawing. Below, as a desirable operation gestalt, although a full colour copying machine system is explained to a detail, this invention is not restricted to this operation gestalt.
[0013] [Equipment outline] drawing 1 is the general-view Fig. of the full colour copying machine system of 1 operation gestalt concerning this invention, and 101 is image formation equipment with which a host computer and 102 have a controller and 103 has the reader section and the printer section.
[0014] Image formation equipment 103 outputs the color picture sent from a computer 101 through a controller 102 while carrying out the color copy of the manuscript image placed on the manuscript base. Here, on a host computer 101, the so-called application software of DTP (Desk Top Publishing) operates, and various documents and a graphic form are created or edited. A host computer 101 changes the drawn-up document and a graphic form into the data described by Page Description Language (PDL: Page Discription Language) like PostScript of for example, an Adobe company, and sends them to a controller 102 through an interconnection cable 243. A controller 102 translates the PDL data sent from the host computer 102, and rasterizes them to the picture signal for every pixel. The rasterized picture signal is sent with image formation equipment 103 through an interconnection cable 242, and an image is outputted.
[0015] A host computer 101, a controller 102, and image formation equipment 103 can perform data communication mutually bidirectionally here.
[0016] [Image formation equipment general-view] drawing 2 is the general-view Fig. of image formation equipment 103.
[0017] - When copying a manuscript image as a copying machine, the manuscript 202 placed on manuscript base glass 201 is irradiated by lighting 203. Image formation of the reflected light from a

manuscript 202 is carried out on the CCD sensor 208 according to optical system 207 through a mirror 204,205,206. Furthermore, the second mirror unit 211 which drives mechanically the first mirror unit 210 including a mirror 204 and lighting 203 at a rate V, and contains a mirror 205,206 is driven at rates 1/2V by the motor 209, and the whole surface of a manuscript 202 is scanned.
[0018] The image-processing section 212 processes as an electrical signal, and on the image memory 109 mentioned later, the image information outputted from the CCD sensor 208 is once held, and it outputs it as a print signal. The print signal outputted from the image-processing section 212 is sent to a non-illustrated laser driver, and drives four non-illustrated semiconductor laser. One of the laser beams which emitted light by four semiconductor laser is scanned by the polygon mirror 213, and it forms a latent image on a photoconductor drum 217 through a mirror 214,215,216. Respectively other laser beams are scanned by the polygon mirror 213, form a latent image on a photoconductor drum 221 through a mirror 218,219,220, form a latent image on a photoconductor drum 225 through a mirror 222,223,224, and form a latent image on a photoconductor drum 229 through a mirror 226,227,228.
[0019] Thus, the latent image formed on each photoconductor drum is developed by the development counter 230 which supplies the toner of yellow (Y), the development counter 231 which supplies the toner of a Magenta (M), the development counter 232 which supplies the toner of cyanogen (C), and the development counter 233 which supplies the toner of black (K), respectively. The developed toner image of four colors is imprinted by the recording paper, and can obtain a full color output image.
[0020] Through the resist roller 237, the imprint belt 238 is adsorbed and the recording paper supplied from either the recording paper cassette 234,235 or the detachable tray 236 is conveyed. Feed timing and a synchronization are taken, the toner image of each color is developed beforehand, and a toner image is imprinted with conveyance of the recording paper to the recording paper at a photoconductor drum 217,221,225,229 top. It dissociates from the conveyance belt 238, and is conveyed with the conveyance belt 239, a fixing assembly 240 is fixed to a toner, and the detail paper with which the toner image of four colors was imprinted is discharged to a paper output tray 241.
[0021] In addition, since four photoconductor drums keep their distance d, and are arranged at equal intervals and the recording paper is conveyed with constant speed V with the conveyance belt 238, a timing synchronization is taken to this and four semiconductor laser drives.
[0022] - After the image outputted from the host computer 101 when the image sent from a host computer 101 was outputted lets the interface cable 242 pass through a controller 102 and transfer direct is carried out to an image memory 109, an image is formed like the case of copying machine actuation.
[0023] [Flow of picture signal] drawing 3 is the block diagram showing the flow of a picture signal.
[0024] - It is changed into the picture signal showing an object image of (Red R) Green (G) and three color components of blue (B) by the image-processing section 212CCD sensor 208, and is outputted as a digital signal by it, respectively.
[0025] 112 is the input masking section and changes zero BR0G0 inputted signal into the signal of a standard RGB color space by the operation shown in a degree type. However, cij (i= 1, 2, and 3 j= 1, 2, 3) of a degree type is the constant of the equipment proper in consideration of many properties, such as the sensibility property of the CCD sensor 208, and the spectral characteristics of lighting 203.

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} c11 & c12 & c13 \\ c21 & c22 & c23 \\ c31 & c32 & c33 \end{bmatrix} \begin{bmatrix} R0 \\ G0 \\ B0 \end{bmatrix} \quad \cdots(1)$$

[0026] 104 is brightness / concentration transducer, is constituted by the look-up table of RAM or ROM, and performs the operation shown in a degree type.
C1 =-K-log(R/255) M1 =-K-log (G/255) -- For (2) Y1 =-K-log (B/255), however K, a constant and the bottom of log are 10. [0027] 106 is output masking / the UCR section, and changes 1YM1C1 signal into the YMCK signal which is the toner color of image formation equipment 103 by the operation shown in

a degree type. However, aij (i= 1, 2 and 3, 4j=1, 2, 3, 4) of a degree type is the constant of the equipment proper in consideration of the tint property of a toner.

$$\begin{bmatrix} C \\ M \\ Y \\ K \end{bmatrix} = \begin{bmatrix} a11 & a21 & a31 & a41 \\ a12 & a22 & a32 & a42 \\ a13 & a23 & a33 & a43 \\ a14 & a24 & a34 & a44 \end{bmatrix} \begin{bmatrix} C1 \\ M1 \\ Y1 \\ K1 \end{bmatrix} \quad \cdots(3)$$

However, K1 = min (C1, M1, Y1) -- (4) [0028] R0G0B0 signal outputted from the CCD sensor 208 is changed and outputted to the YMCK signal corresponding to the spectral-distribution property of a toner by the above-mentioned (1) to (4) type.
[0029] On the other hand, 105 is an alphabetic character / line drawing detecting element, judges whether each pixel in a manuscript image is some of alphabetic characters or line drawings, and generates the judgment signal TEXT. 107 is compression/expanding section, and from memory 108, it read, and data decompression of it is carried out, and it reproduces C1Y1M1 picture signal and the judgment signal TEXT while storing in memory 108, after compressing C1Y1M1 picture signal and the judgment signal TEXT and dropping amount of information.
[0030] - A controller 102110 is CPU, and it performs expansion of PDL data etc. using RAM and the buffer which are not illustrated while it controls the controller 102 whole based on the program stored in the program ROM which is not illustrated.
[0031] 109 is sent to the PWM circuit 113 which forms the PWM signal for being an image memory and driving the semiconductor laser which the YMCK signal which suited the spectral-distribution property of the toner which let the cable 242 pass and was described above was stored, and it was read synchronizing with the image formation timing by the side of a copying machine, and was mentioned above and which is mentioned later. Moreover, an image memory 109 not only holds the above-mentioned YMCK signal, but the RGB code outputted from the host computer 101, the RGB code (the parameter which outputs an input signal as it is (through) is set to brightness / concentration transducer 104, and the output masking / the UCR section 106 in this case) outputted from the input masking section 112 may hold it.
[0032] 111 is an alphabetic character / line drawing detecting element, and the detail is mentioned later.
[0033] Although both actuation (henceforth "copying machine actuation") with a copying machine simple substance and the "system behavior" containing a controller 102 exist in the system of a [copying machine actuation] book operation gestalt, copying machine actuation is explained first.
[0034] The picture signal which was outputted from the CCD sensor 208 in copying machine actuation is written in memory 108, after the judgment signal TEXT outputted from an alphabetic character / line drawing judging section 105 is compressed by compression/expanding section 107, while being written in memory 108, after being compressed by compression/expanding section 107 through the input masking section 112, and the brightness / concentration transducer 104. And compression/expanding section 107 develops and the data read from memory 108 are sent to a laser driver through the PWM circuit 113 mentioned later synchronizing with the image formation timing of a copying machine. Drawing 4 is drawing showing the example of timing of this copying machine actuation.
[0035] In drawing 4, a picture signal is read to the timing which it is written in memory 108 to the timing shown with a sign 1101, and is shown with signs 1102-1105. The relation of timing shown with signs 1102-1105 has read-out initiation spacing of time amount d/V, respectively, as shown in drawing. Here, as mentioned above, d is spacing of four photoconductor drums arranged at equal intervals, and V is the bearer rate of the conveyance belt 238. Moreover, it cannot be overemphasized that the read-out initiation timing of Y stage shown with a sign 1102 comes after the write-in initiation timing shown with a sign 1101.
[0036] [System behavior] system behavior is greatly kicked by scanning actuation, PDL expansion

actuation, an alphabetic character / line drawing extract actuation, and print-out actuation an exception.
[0037] - It is the actuation which incorporates the picture signal which read the scanning actuation manuscript for a controller 102, and RGB data or YMCK data is held in an image memory 109. When reading RGB data, as mentioned above, brightness / concentration transducer 104, and the output masking / the UCR section 106 become through. Thus, RGB data and YMCK data can be incorporated in common Rhine.
[0038] - It is the actuation which develops the PDL data inputted from the PDL expansion actuation host computer 101 in a full color image, and is written in an image memory 109. This full color image is developed as image data whose color was separated into four colors of YMCK according to the output characteristics (a concentration property, color reproduction property) which image formation equipment 103 has.
[0039] - It is the actuation which judges whether they are an alphabetic character / line drawing section about each part of read-out and its full color image about the full color image data which an alphabetic character / line drawing extract actuation expansion was carried out, and was written in the image memory 109. An alphabetic character / line drawing detecting element 111 writes in the judgment signal TEXT which shows whether each part of the full color image read from the image memory 109 is an alphabetic character / line drawing section, and shows the judgment result on an image memory 109.
[0040] - An image is outputted in the full color image data memorized in the print-out actuation image memory 109, and the actuation which sends the judgment signal TEXT to read-out and the PWM circuit 113 mentioned later synchronizing with rotation of four photoconductor drums.
[0041] - The timing chart 5 of operation is drawing showing the example of timing of this system behavior, in the section shown with a sign 1201, scanning actuation or PDL expansion actuation is performed, and write-in actuation to an image memory 109 is performed to coincidence. The image data written in the image memory 109 is read to the timing shown with signs 1203-1206 at the same time an alphabetic character / line drawing extract is carried out in the section shown with a sign 1202. The relation of timing shown with signs 1203-1206 has read-out initiation spacing of time amount d/V, respectively, as shown in drawing.
[0042] Here, a characteristic thing is that generating of the judgment signal TEXT by the alphabetic character / line drawing detecting element 111, actuation which records the generated judgment signal TEXT on an image memory 109, and read-out of full color image data and its judgment signal TEXT are performed to coincidence (being concurrent), and can accelerate processing compared with the case where these actuation is performed one by one. In addition, simultaneous-processing control of these actuation is performed by CPU110. That is, CPU110 can be realized by performing store to an image memory 109, and read-out actuation to time sharing.
[0043] An alphabetic character / [line drawing judging section] drawing 6 is the block diagrams showing the example of a configuration of an alphabetic character / line drawing detecting element 105, and an alphabetic character / line drawing detecting element 105 extracts an alphabetic character and a line drawing part from the RGB picture signal which read the manuscript, and generates the judgment signal TEXT which is set to '1' when the pixel concerned constitutes an alphabetic character or the line drawing section, and is set to '0' except it.
[0044] In drawing 6, 601 is ND signal generation machine and generates ND signal which is a lightness signal which took human being's visibility property into consideration from the full color RGB picture signal by the sum-of-products operation shown in a degree type. However, d1, d2, and d3 are the constants in consideration of human being's visibility property.

$$ND = [d1\ d2\ d3] \begin{bmatrix} R \\ G \\ B \end{bmatrix} \quad \cdots(5)$$

[0045] It is an alphabetic character / line drawing judging section, 602 extracts an alphabetic character / line drawing part from the lightness signal ND, when the pixel concerned constitutes an alphabetic character or the line drawing section, it generates '1', and it generates '0' except it. In addition, since this kind of circuit is well-known, that detail explanation is omitted.
[0046] Similarly, drawing 7 is the block diagram showing the example of a configuration of an alphabetic character / line drawing detecting element 111, and an alphabetic character / line drawing detecting element 111 extracts an alphabetic character and a line drawing part from a YMCK picture signal, and generates the judgment signal TEXT which is set to '1' when the pixel concerned constitutes an alphabetic character or the line drawing section, and is set to '0' except it.
[0047] In drawing 6, 701 is ND signal generation machine and generates in approximation ND signal which is a lightness signal which took human being's visibility property into consideration from the full color YMCK picture signal by the sum-of-products operation shown in a degree type. However, e1, e2, e3, and e4 are the constants in consideration of human being's visibility property.

$$ND = [e1\ e2\ e3\ e4] \begin{bmatrix} Y \\ M \\ C \\ K \end{bmatrix} \quad \cdots(6)$$

[0048] Moreover, an alphabetic character / line drawing judging section 602 is the same as that of the alphabetic character / line drawing judging section 602 shown in drawing 6.
[0049] [Judgment signal TEXT] drawing 8 is drawing for explaining the judgment signal TEXT, 401 shows the example of the manuscript read or the image printed out, and 402 is an image in which the judgment signal TEXT in an image 401 is shown two-dimensional. That is, the alphabetic character / line drawing part in an image 401 are shown to an image 402 by "black", and is shown by "white" except it. 403 is the image to which some images 402 were expanded, the pixel of - mark shown with a sign 404 is a pixel which constitutes an alphabetic character / line drawing section, and the TEXT signal is set to '1'. On the other hand, the pixel of O mark shown with a sign 405 is a pixel which constitutes an alphabetic character / except a line drawing, and the TEXT signal is set to '0'.
[0050] [Image memory] drawing 9 is drawing for explaining the structure of the data held in an image memory 109, and how reading, and 501 shows an example of the address map in an image memory 109. For example, the image data 502 of yellow (Y), the image data 503 of a Magenta (M), the image data 504 of cyanogen (C), and the image data 505 of black (K) are attached to 1 pixel, respectively, and have 8-bit information. Moreover, the data 506 of the judgment signal TEXT are attached to 1 pixel, and have 1-bit information.
[0051] Each data of the above [507] shows notionally how it is read. That is, synchronizing with the image formation of a photoconductor drum 217, the K image data 505 is read [the Y image data 502 / the M image data 503] for the C image data 504 synchronizing with the image formation of a photoconductor drum 229 synchronizing with the image formation of a photoconductor drum 225, respectively synchronizing with the image formation of a photoconductor drum 221. Furthermore, the data 506 of the judgment signal TEXT are read to four-line coincidence synchronizing with said all four photoconductor drums (being concurrent).
[0052] [PWM circuit] drawing 10 is the block diagram showing the example of a configuration of the PWM circuit 113.
[0053] In drawing 10, 901 is an PWM circuit for yellow (Y), and generates the digital image signal of yellow (Y), and the analog signal for sending to the laser driver which the judgment signal TEXT is inputted synchronizing with it, and drives the semiconductor laser for yellow (Y). 902 generates an analog signal for the PWM circuit for Magentas (M) and 903 to be the PWM circuits for blacks (K), and send the PWM circuit for cyanogen (C), and 904 to the laser driver which the judgment signal TEXT is

inputted respectively synchronizing with the digital image signal of the color component, and it, and drives semiconductor laser.
[0054] Drawing 11 is the block diagram showing the example of a configuration of the PWM circuit of each color component, and is the circuitry same regardless of a color component.
[0055] In drawing 11, 1001 is a D/A converter and changes the inputted digital image signal into an analog picture signal. 1002 is the triangular wave generator for images which thinks gradation nature as important, for example, generates the triangular wave in a cycle of 2 pixel. 1003 is the triangular wave generating circuit for images which thinks resolution as important, and generates the triangular wave in a cycle of 1 pixel. 1004 is a selector, based on the judgment signal TEXT, chooses any of the 2 triangular waves from which a period differs they are, and outputs. That is, the selector 1004 has chosen the number of PWM lines (resolution) based on the judgment signal TEXT. 1005 is a comparator and compares the analog picture signal outputted from D/A converter 1001 with the triangular wave chosen by the selector 1004.
[0056] The triangular wave and analog picture signal in a cycle of 1 pixel which think resolution as important in an alphabetic character and the line drawing section by the above configuration are compared, and, on the other hand, the pulse signal by which the triangular wave and analog picture signal of the 2 pixel period of ****** were compared, and Pulse Density Modulation (PWM) was carried out in gradation nature in addition to an alphabetic character and the line drawing section is outputted. This pulse signal is sent to the laser driver which is not illustrated.
[0057] In addition, the period of the triangular wave which thinks gradation nature as important is not limited to 2 pixels, and is set to the period of 3 pixel, the period of 4 pixel, etc. by relation with the resolution of the image formation section.
[0058] Drawing 12 is an example of a timing chart in an PWM circuit, the upper case of this drawing shows the PWM timing at the time of thinking gradation nature as important, the output 801 of D/A converter 1001 is compared with the triangular wave 802 of a 2-pixel unit, and a pulse signal 803 is outputted from a comparator 105. On the other hand, the lower berth of this drawing shows the PWM timing at the time of thinking resolution as important, the output 804 of D/A converter 1001 is compared with the triangular wave 805 of a 1-pixel unit, and a pulse signal 806 is outputted from a comparator 105.
[0059] Since pulse signals 803 and 806 are changed accommodative by the judgment signal TEXT which shows whether it is a part in addition to the alphabetic character/line drawing with which each part of the image to output thinks as important the alphabetic character / line drawing section which thinks resolution as important, and gradation nature and it is outputted in fact, desirable image formation will be performed.
[0060] It judges whether it is the pixel which constitutes an alphabetic character / line drawing section from any [of the image generated by the image or computer read in the manuscript as explained above] case about each pixel, and by choosing for every pixel whether resolution is thought as important or gradation nature is thought as important accommodative, an alphabetic character / line drawing part can think resolution as important, and can perform the image output which thought gradation nature as important except it.
[0061]
[Other operation gestalten] Even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface, a printer, a reader, etc.), it may be applied to the equipment which consists of one devices (for example, a copying machine, facsimile apparatus, etc.).
[0062] Moreover, it cannot be overemphasized by supplying the storage which recorded the program of the software which attains this invention to a system or equipment, and carrying out read-out activation of the program by which the system or equipment was stored in the storage that it can apply also when this invention is attained. As a storage for supplying a program, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.
[0063] Moreover, in a controller 102, although the image memory 109 was made to memorize the

description signal, another memory may be prepared in the description signals.
[0064] Moreover, an alphabetic character/not only line drawing but black alphabetic character/line drawing, and the descriptions, such as a photograph/halftone dot, are sufficient as the description of the picture signal expressed by the description signal.
[0065]
[Effect of the Invention] As explained above, according to this invention, the description of the image inputted from the external instrument can be recognized, and the image processing system which outputs an image accommodative according to the description, and its approach can be offered.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the image processing system of the image processing system which operates also as a printer also as a copying machine, and its approach, concerning an image processing system and its approach.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] These people have proposed the image formation equipment which consists of an image reading means to read an image and to change into a picture signal, a memory means to hold the acquired picture signal, and the image output section that outputs the held picture signal and which operates as a color copying machine.
[0003] Furthermore, after connecting above-mentioned image formation equipment and an above-mentioned host computer, rasterizing the color picture created with the host computer by the controller through a controller and holding in the memory inside a controller, these people have also proposed the system which is outputted with image formation equipment and which operates as a color printer. This system operates also as a color printer also as a color copying machine based on directions of an operator.
[0004] Furthermore, in case the copy output of the manuscript placed on the platen is carried out, the alphabetic character and the line drawing part have been recognized, these were reproduced with high resolution, and these people have proposed the copying machine which performs reappearance from which parts other than these attached greater importance than to resolution to gradation nature accommodative.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, the description of the image inputted from the external instrument can be recognized, and the image processing system which outputs an image accommodative according to the description, and its approach can be offered.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there are the following troubles in the technique mentioned above. That is, in equipment and the system which were mentioned above, about the image inputted from external instruments, such as a computer, since adaptation processing which was mentioned above is not performed, the gradation nature and the resolution of an output image are immobilization on the whole image surface, when gradation nature is thought as important, the resolution of an alphabetic character / line drawing part becomes low, and when resolution is thought as important, the gradation nature of a gradation part cannot but become low.
[0006] This invention is for solving an above-mentioned problem, recognizes the description of the image inputted from the external instrument, and aims at offering the image processing system which can output an image accommodative according to the description, and its approach.

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MEANS

[Means for Solving the Problem] This invention is equipped with the following configurations as a way stage which attains the aforementioned purpose.
[0008] A storage means to hold the color picture signal into which the image processing system concerning this invention was inputted, A monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from said storage means, It is characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.

[0009] Moreover, when said color picture signal is inputted as a storage means to hold the inputted color picture signal, from an external instrument, A monochrome signal generation means to generate a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from said storage means, It is characterized by generating the description signal with which the description for every pixel of said color picture is expressed from said monochrome signal, and having an output means to read and output a color picture signal and its description signal from a feature detection means to store in said storage means, and said storage means.

[0010] The monochrome signal generation step which generates a monochrome signal from two or more color component signals which constitute read-out and its color picture signal for a color picture signal from a storage means to hold the color picture signal into which the image-processing approach concerning this invention was inputted, The description signal with which the description for every pixel of said color picture is expressed from said monochrome signal is generated, and it is characterized by having with the output step which reads and outputs a color picture signal and its description signal from the feature detection step stored in said storage means, and said storage means.
[0011] When a color picture signal is inputted from an external instrument, the color picture signal from a storage means to hold the color picture signal Moreover, read-out, The monochrome signal generation step which generates a monochrome signal from two or more color component signals which constitute the color picture signal, The description signal with which the description for every pixel of said color picture is expressed from said monochrome signal is generated, and it is characterized by having the output step which reads and outputs a picture signal and its description signal from the feature detection step stored in said storage means, and said storage means.
[0012]
[Embodiment of the Invention] Hereafter, the image processing system of 1 operation gestalt concerning this invention is explained to a detail with reference to a drawing. Below, as a desirable operation gestalt, although a full colour copying machine system is explained to a detail, this invention is not restricted to this operation gestalt.
[0013] [Equipment outline] drawing 1 is the general-view Fig. of the full colour copying machine

system of 1 operation gestalt concerning this invention, and 101 is image formation equipment with which a host computer and 102 have a controller and 103 has the reader section and the printer section.
[0014] Image formation equipment 103 outputs the color picture sent from a computer 101 through a controller 102 while carrying out the color copy of the manuscript image placed on the manuscript base. Here, on a host computer 101, the so-called application software of DTP (Desk Top Publishing) operates, and various documents and a graphic form are created or edited. A host computer 101 changes the drawn-up document and a graphic form into the data described by Page Description Language (PDL: Page Discription Language) like PostScript of for example, an Adobe company, and sends them to a controller 102 through an interconnection cable 243. A controller 102 translates the PDL data sent from the host computer 102, and rasterizes them to the picture signal for every pixel. The rasterized picture signal is sent with image formation equipment 103 through an interconnection cable 242, and an image is outputted.
[0015] A host computer 101, a controller 102, and image formation equipment 103 can perform data communication mutually bidirectionally here.
[0016] [Image formation equipment general-view] drawing 2 is the general-view Fig. of image formation equipment 103.
[0017] - When copying a manuscript image as a copying machine, the manuscript 202 placed on manuscript base glass 201 is irradiated by lighting 203. Image formation of the reflected light from a manuscript 202 is carried out on the CCD sensor 208 according to optical system 207 through a mirror 204,205,206. Furthermore, the second mirror unit 211 which drives mechanically the first mirror unit 210 including a mirror 204 and lighting 203 at a rate V, and contains a mirror 205,206 is driven at rates 1/2V by the motor 209, and the whole surface of a manuscript 202 is scanned.
[0018] The image-processing section 212 processes as an electrical signal, and on the image memory 109 mentioned later, the image information outputted from the CCD sensor 208 is once held, and it outputs it as a print signal. The print signal outputted from the image-processing section 212 is sent to a non-illustrated laser driver, and drives four non-illustrated semiconductor laser. One of the laser beams which emitted light by four semiconductor laser is scanned by the polygon mirror 213, and it forms a latent image on a photoconductor drum 217 through a mirror 214,215,216. Respectively other laser beams are scanned by the polygon mirror 213, form a latent image on a photoconductor drum 221 through a mirror 218,219,220, form a latent image on a photoconductor drum 225 through a mirror 222,223,224, and form a latent image on a photoconductor drum 229 through a mirror 226,227,228.
[0019] Thus, the latent image formed on each photoconductor drum is developed by the development counter 230 which supplies the toner of yellow (Y), the development counter 231 which supplies the toner of a Magenta (M), the development counter 232 which supplies the toner of cyanogen (C), and the development counter 233 which supplies the toner of black (K), respectively. The developed toner image of four colors is imprinted by the recording paper, and can obtain a full color output image.
[0020] Through the resist roller 237, the imprint belt 238 is adsorbed and the recording paper supplied from either the recording paper cassette 234,235 or the detachable tray 236 is conveyed. Feed timing and a synchronization are taken, the toner image of each color is developed beforehand, and a toner image is imprinted with conveyance of the recording paper to the recording paper at a photoconductor drum 217,221,225,229 top. It dissociates from the conveyance belt 238, and is conveyed with the conveyance belt 239, a fixing assembly 240 is fixed to a toner, and the detail paper with which the toner image of four colors was imprinted is discharged to a paper output tray 241.
[0021] In addition, since four photoconductor drums keep their distance d, and are arranged at equal intervals and the recording paper is conveyed with constant speed V with the conveyance belt 238, a timing synchronization is taken to this and four semiconductor laser drives.
[0022] - After the image outputted from the host computer 101 when the image sent from a host computer 101 was outputted lets the interface cable 242 pass through a controller 102 and transfer direct is carried out to an image memory 109, an image is formed like the case of copying machine actuation.
[0023] [Flow of picture signal] drawing 3 is the block diagram showing the flow of a picture signal.
[0024] - It is changed into the picture signal showing an object image of (Red R) Green (G) and three

color components of blue (B) by the image-processing section 212CCD sensor 208, and is outputted as a digital signal by it, respectively.

[0025] 112 is the input masking section and changes zero BR0G0 inputted signal into the signal of a standard RGB color space by the operation shown in a degree type. However, cij (i= 1, 2, and 3 j= 1, 2, 3) of a degree type is the constant of the equipment proper in consideration of many properties, such as the sensibility property of the CCD sensor 208, and the spectral characteristics of lighting 203.

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} c11 & c12 & c13 \\ c21 & c22 & c23 \\ c31 & c32 & c33 \end{bmatrix} \begin{bmatrix} R0 \\ G0 \\ B0 \end{bmatrix} \quad \cdots(1)$$

[0026] 104 is brightness / concentration transducer, is constituted by the look-up table of RAM or ROM, and performs the operation shown in a degree type.

C1 =-K-log(R/255) M1 =-K-log (G/255) -- For (2) Y1 =-K-log (B/255), however K, a constant and the bottom of log are 10. [0027] 106 is output masking / the UCR section, and changes 1YM1C1 signal into the YMCK signal which is the toner color of image formation equipment 103 by the operation shown in a degree type. However, aij (i= 1, 2 and 3, 4j=1, 2, 3, 4) of a degree type is the constant of the equipment proper in consideration of the tint property of a toner.

$$\begin{bmatrix} C \\ M \\ Y \\ K \end{bmatrix} = \begin{bmatrix} a11 & a21 & a31 & a41 \\ a12 & a22 & a32 & a42 \\ a13 & a23 & a33 & a43 \\ a14 & a24 & a34 & a44 \end{bmatrix} \begin{bmatrix} C1 \\ M1 \\ Y1 \\ K1 \end{bmatrix} \quad \cdots(3)$$

However, K1 = min (C1, M1, Y1) -- (4) [0028] R0G0B0 signal outputted from the CCD sensor 208 is changed and outputted to the YMCK signal corresponding to the spectral-distribution property of a toner by the above-mentioned (1) to (4) type.

[0029] On the other hand, 105 is an alphabetic character / line drawing detecting element, judges whether each pixel in a manuscript image is some of alphabetic characters or line drawings, and generates the judgment signal TEXT. 107 is compression/expanding section, and from memory 108, it read, and data decompression of it is carried out, and it reproduces C1Y1M1 picture signal and the judgment signal TEXT while storing in memory 108, after compressing C1Y1M1 picture signal and the judgment signal TEXT and dropping amount of information.

[0030] - A controller 102110 is CPU, and it performs expansion of PDL data etc. using RAM and the buffer which are not illustrated while it controls the controller 102 whole based on the program stored in the program ROM which is not illustrated.

[0031] 109 is sent to the PWM circuit 113 which forms the PWM signal for being an image memory and driving the semiconductor laser which the YMCK signal which suited the spectral-distribution property of the toner which let the cable 242 pass and was described above was stored, and it was read synchronizing with the image formation timing by the side of a copying machine, and was mentioned above and which is mentioned later. Moreover, an image memory 109 not only holds the above-mentioned YMCK signal, but the RGB code outputted from the host computer 101, the RGB code (the parameter which outputs an input signal as it is (through) is set to brightness / concentration transducer 104, and the output masking / the UCR section 106 in this case) outputted from the input masking section 112 may hold it.

[0032] 111 is an alphabetic character / line drawing detecting element, and the detail is mentioned later.

[0033] Although both actuation (henceforth "copying machine actuation") with a copying machine

simple substance and the "system behavior" containing a controller 102 exist in the system of a [copying machine actuation] book operation gestalt, copying machine actuation is explained first.
[0034] The picture signal which was outputted from the CCD sensor 208 in copying machine actuation is written in memory 108, after the judgment signal TEXT outputted from an alphabetic character / line drawing judging section 105 is compressed by compression/expanding section 107, while being written in memory 108, after being compressed by compression/expanding section 107 through the input masking section 112, and the brightness / concentration transducer 104. And compression/expanding section 107 develops and the data read from memory 108 are sent to a laser driver through the PWM circuit 113 mentioned later synchronizing with the image formation timing of a copying machine. Drawing 4 is drawing showing the example of timing of this copying machine actuation.
[0035] In drawing 4, a picture signal is read to the timing which it is written in memory 108 to the timing shown with a sign 1101, and is shown with signs 1102-1105. The relation of timing shown with signs 1102-1105 has read-out initiation spacing of time amount d/V, respectively, as shown in drawing. Here, as mentioned above, d is spacing of four photoconductor drums arranged at equal intervals, and V is the bearer rate of the conveyance belt 238. Moreover, it cannot be overemphasized that the read-out initiation timing of Y stage shown with a sign 1102 comes after the write-in initiation timing shown with a sign 1101.
[0036] [System behavior] system behavior is greatly kicked by scanning actuation, PDL expansion actuation, an alphabetic character / line drawing extract actuation, and print-out actuation an exception.
[0037] - It is the actuation which incorporates the picture signal which read the scanning actuation manuscript for a controller 102, and RGB data or YMCK data is held in an image memory 109. When reading RGB data, as mentioned above, brightness / concentration transducer 104, and the output masking / the UCR section 106 become through. Thus, RGB data and YMCK data can be incorporated in common Rhine.
[0038] - It is the actuation which develops the PDL data inputted from the PDL expansion actuation host computer 101 in a full color image, and is written in an image memory 109. This full color image is developed as image data whose color was separated into four colors of YMCK according to the output characteristics (a concentration property, color reproduction property) which image formation equipment 103 has.
[0039] - It is the actuation which judges whether they are an alphabetic character / line drawing section about each part of read-out and its full color image about the full color image data which an alphabetic character / line drawing extract actuation expansion was carried out, and was written in the image memory 109. An alphabetic character / line drawing detecting element 111 writes in the judgment signal TEXT which shows whether each part of the full color image read from the image memory 109 is an alphabetic character / line drawing section, and shows the judgment result on an image memory 109.
[0040] - An image is outputted in the full color image data memorized in the print-out actuation image memory 109, and the actuation which sends the judgment signal TEXT to read-out and the PWM circuit 113 mentioned later synchronizing with rotation of four photoconductor drums.
[0041] - The timing chart 5 of operation is drawing showing the example of timing of this system behavior, in the section shown with a sign 1201, scanning actuation or PDL expansion actuation is performed, and write-in actuation to an image memory 109 is performed to coincidence. The image data written in the image memory 109 is read to the timing shown with signs 1203-1206 at the same time an alphabetic character / line drawing extract is carried out in the section shown with a sign 1202. The relation of timing shown with signs 1203-1206 has read-out initiation spacing of time amount d/V, respectively, as shown in drawing.
[0042] Here, a characteristic thing is that generating of the judgment signal TEXT by the alphabetic character / line drawing detecting element 111, actuation which records the generated judgment signal TEXT on an image memory 109, and read-out of full color image data and its judgment signal TEXT are performed to coincidence (being concurrent), and can accelerate processing compared with the case where these actuation is performed one by one. In addition, simultaneous-processing control of these actuation is performed by CPU110. That is, CPU110 can be realized by performing store to an image

memory 109, and read-out actuation to time sharing.
[0043] An alphabetic character / [line drawing judging section] drawing 6 is the block diagrams showing the example of a configuration of an alphabetic character / line drawing detecting element 105, and an alphabetic character / line drawing detecting element 105 extracts an alphabetic character and a line drawing part from the RGB picture signal which read the manuscript, and generates the judgment signal TEXT which is set to '1' when the pixel concerned constitutes an alphabetic character or the line drawing section, and is set to '0' except it.
[0044] In drawing 6, 601 is ND signal generation machine and generates ND signal which is a lightness signal which took human being's visibility property into consideration from the full color RGB picture signal by the sum-of-products operation shown in a degree type. However, d1, d2, and d3 are the constants in consideration of human being's visibility property.

$$ND = [d1\ d2\ d3] \begin{bmatrix} R \\ G \\ B \end{bmatrix} \quad \cdots(5)$$

[0045] It is an alphabetic character / line drawing judging section, 602 extracts an alphabetic character / line drawing part from the lightness signal ND, when the pixel concerned constitutes an alphabetic character or the line drawing section, it generates '1', and it generates '0' except it. In addition, since this kind of circuit is well-known, that detail explanation is omitted.
[0046] Similarly, drawing 7 is the block diagram showing the example of a configuration of an alphabetic character / line drawing detecting element 111, and an alphabetic character / line drawing detecting element 111 extracts an alphabetic character and a line drawing part from a YMCK picture signal, and generates the judgment signal TEXT which is set to '1' when the pixel concerned constitutes an alphabetic character or the line drawing section, and is set to '0' except it.
[0047] In drawing 6, 701 is ND signal generation machine and generates in approximation ND signal which is a lightness signal which took human being's visibility property into consideration from the full color YMCK picture signal by the sum-of-products operation shown in a degree type. However, e1, e2, e3, and e4 are the constants in consideration of human being's visibility property.

$$ND = [e1\ e2\ e3\ e4] \begin{bmatrix} Y \\ M \\ C \\ K \end{bmatrix} \quad \cdots(6)$$

[0048] Moreover, an alphabetic character / line drawing judging section 602 is the same as that of the alphabetic character / line drawing judging section 602 shown in drawing 6.
[0049] [Judgment signal TEXT] drawing 8 is drawing for explaining the judgment signal TEXT, 401 shows the example of the manuscript read or the image printed out, and 402 is an image in which the judgment signal TEXT in an image 401 is shown two-dimensional. That is, the alphabetic character / line drawing part in an image 401 are shown to an image 402 by "black", and is shown by "white" except it. 403 is the image to which some images 402 were expanded, the pixel of - mark shown with a sign 404 is a pixel which constitutes an alphabetic character / line drawing section, and the TEXT signal is set to '1'. On the other hand, the pixel of O mark shown with a sign 405 is a pixel which constitutes an alphabetic character / except a line drawing, and the TEXT signal is set to '0'.
[0050] [Image memory] drawing 9 is drawing for explaining the structure of the data held in an image memory 109, and how reading, and 501 shows an example of the address map in an image memory 109.

For example, the image data 502 of yellow (Y), the image data 503 of a Magenta (M), the image data 504 of cyanogen (C), and the image data 505 of black (K) are attached to 1 pixel, respectively, and have 8-bit information. Moreover, the data 506 of the judgment signal TEXT are attached to 1 pixel, and have 1-bit information.

[0051] Each data of the above [507] shows notionally how it is read. That is, synchronizing with the image formation of a photoconductor drum 217, the K image data 505 is read [the Y image data 502 / the M image data 503] for the C image data 504 synchronizing with the image formation of a photoconductor drum 229 synchronizing with the image formation of a photoconductor drum 225, respectively synchronizing with the image formation of a photoconductor drum 221. Furthermore, the data 506 of the judgment signal TEXT are read to four-line coincidence synchronizing with said all four photoconductor drums (being concurrent).

[0052] [PWM circuit] drawing 10 is the block diagram showing the example of a configuration of the PWM circuit 113.

[0053] In drawing 10, 901 is an PWM circuit for yellow (Y), and generates the digital image signal of yellow (Y), and the analog signal for sending to the laser driver which the judgment signal TEXT is inputted synchronizing with it, and drives the semiconductor laser for yellow (Y). 902 generates an analog signal for the PWM circuit for Magentas (M) and 903 to be the PWM circuits for blacks (K), and send the PWM circuit for cyanogen (C), and 904 to the laser driver which the judgment signal TEXT is inputted respectively synchronizing with the digital image signal of the color component, and it, and drives semiconductor laser.

[0054] Drawing 11 is the block diagram showing the example of a configuration of the PWM circuit of each color component, and is the circuitry same regardless of a color component.

[0055] In drawing 11, 1001 is a D/A converter and changes the inputted digital image signal into an analog picture signal. 1002 is the triangular wave generator for images which thinks gradation nature as important, for example, generates the triangular wave in a cycle of 2 pixel. 1003 is the triangular wave generating circuit for images which thinks resolution as important, and generates the triangular wave in a cycle of 1 pixel. 1004 is a selector, based on the judgment signal TEXT, chooses any of the 2 triangular waves from which a period differs they are, and outputs. That is, the selector 1004 has chosen the number of PWM lines (resolution) based on the judgment signal TEXT. 1005 is a comparator and compares the analog picture signal outputted from D/A converter 1001 with the triangular wave chosen by the selector 1004.

[0056] The triangular wave and analog picture signal in a cycle of 1 pixel which think resolution as important in an alphabetic character and the line drawing section by the above configuration are compared, and, on the other hand, the pulse signal by which the triangular wave and analog picture signal of the 2 pixel period of ****** were compared, and Pulse Density Modulation (PWM) was carried out in gradation nature in addition to an alphabetic character and the line drawing section is outputted. This pulse signal is sent to the laser driver which is not illustrated.

[0057] In addition, the period of the triangular wave which thinks gradation nature as important is not limited to 2 pixels, and is set to the period of 3 pixel, the period of 4 pixel, etc. by relation with the resolution of the image formation section.

[0058] Drawing 12 is an example of a timing chart in an PWM circuit, the upper case of this drawing shows the PWM timing at the time of thinking gradation nature as important, the output 801 of D/A converter 1001 is compared with the triangular wave 802 of a 2-pixel unit, and a pulse signal 803 is outputted from a comparator 105. On the other hand, the lower berth of this drawing shows the PWM timing at the time of thinking resolution as important, the output 804 of D/A converter 1001 is compared with the triangular wave 805 of a 1-pixel unit, and a pulse signal 806 is outputted from a comparator 105.

[0059] Since pulse signals 803 and 806 are changed accommodative by the judgment signal TEXT which shows whether it is a part in addition to the alphabetic character/line drawing with which each part of the image to output thinks as important the alphabetic character / line drawing section which thinks resolution as important, and gradation nature and it is outputted in fact, desirable image formation

will be performed.
[0060] It judges whether it is the pixel which constitutes an alphabetic character / line drawing section from any [of the image generated by the image or computer read in the manuscript as explained above] case about each pixel, and by choosing for every pixel whether resolution is thought as important or gradation nature is thought as important accommodative, an alphabetic character / line drawing part can think resolution as important, and can perform the image output which thought gradation nature as important except it.
[0061]
[Other operation gestalten] Even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface, a printer, a reader, etc.), it may be applied to the equipment which consists of one devices (for example, a copying machine, facsimile apparatus, etc.).
[0062] Moreover, it cannot be overemphasized by supplying the storage which recorded the program of the software which attains this invention to a system or equipment, and carrying out read-out activation of the program by which the system or equipment was stored in the storage that it can apply also when this invention is attained. As a storage for supplying a program, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.
[0063] Moreover, in a controller 102, although the image memory 109 was made to memorize the description signal, another memory may be prepared in the description signals.
[0064] Moreover, an alphabetic character/not only line drawing but black alphabetic character/line drawing, and the descriptions, such as a photograph/halftone dot, are sufficient as the description of the picture signal expressed by the description signal.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The general-view Fig. of the full colour copying machine system of 1 operation gestalt concerning this invention,
[Drawing 2] The general-view Fig. of the image formation equipment shown in drawing 1,
[Drawing 3] The block diagram showing the flow of a picture signal,
[Drawing 4] Drawing showing the example of timing in copying machine actuation,
[Drawing 5] Drawing showing the example of timing in system behavior,
[Drawing 6] The block diagram showing the example of a configuration of the alphabetic character / line drawing detecting element shown in drawing 3,
[Drawing 7] The block diagram showing the example of a configuration of the alphabetic character / line drawing detecting element shown in drawing 3,
[Drawing 8] Drawing for explaining the judgment signal TEXT,
[Drawing 9] Drawing for explaining the structure of the data held in the image memory shown in drawing 3, and how reading,
[Drawing 10] The block diagram showing the example of a configuration of an PWM circuit,
[Drawing 11] The block diagram showing the example of a configuration of the PWM circuit of each color component,
[Drawing 12] It is an example of a timing chart in an PWM circuit.

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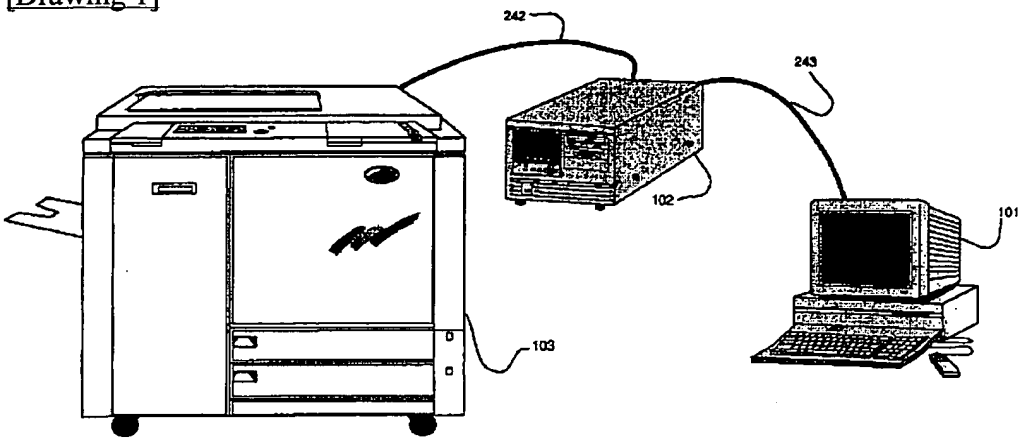
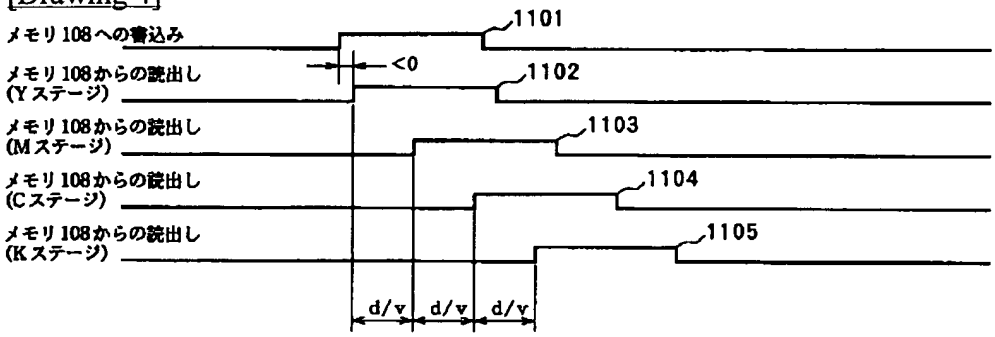
DRAWINGS

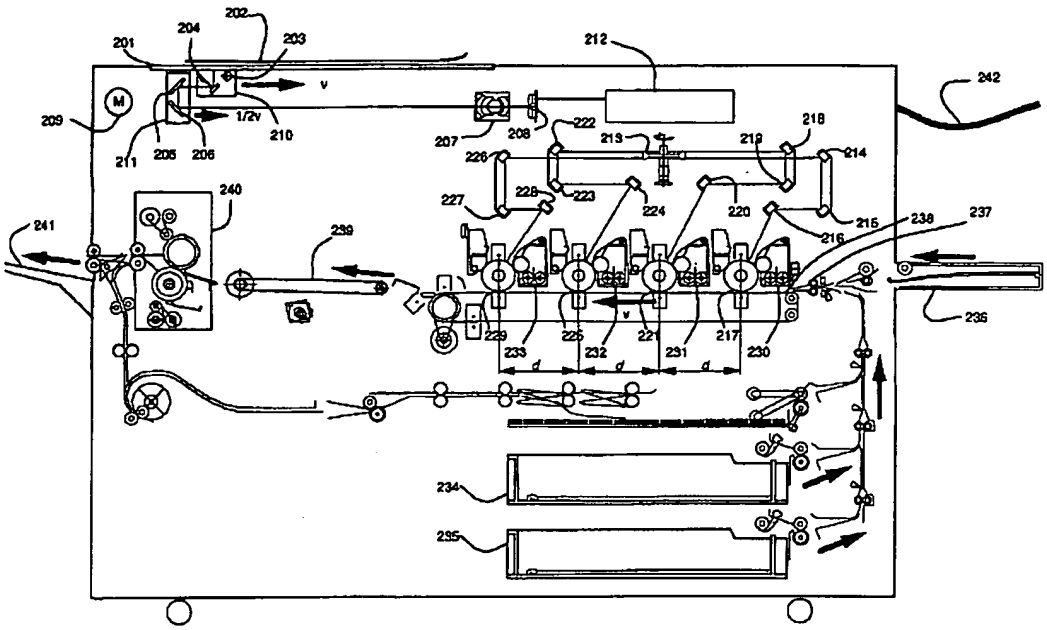
[Drawing 1]



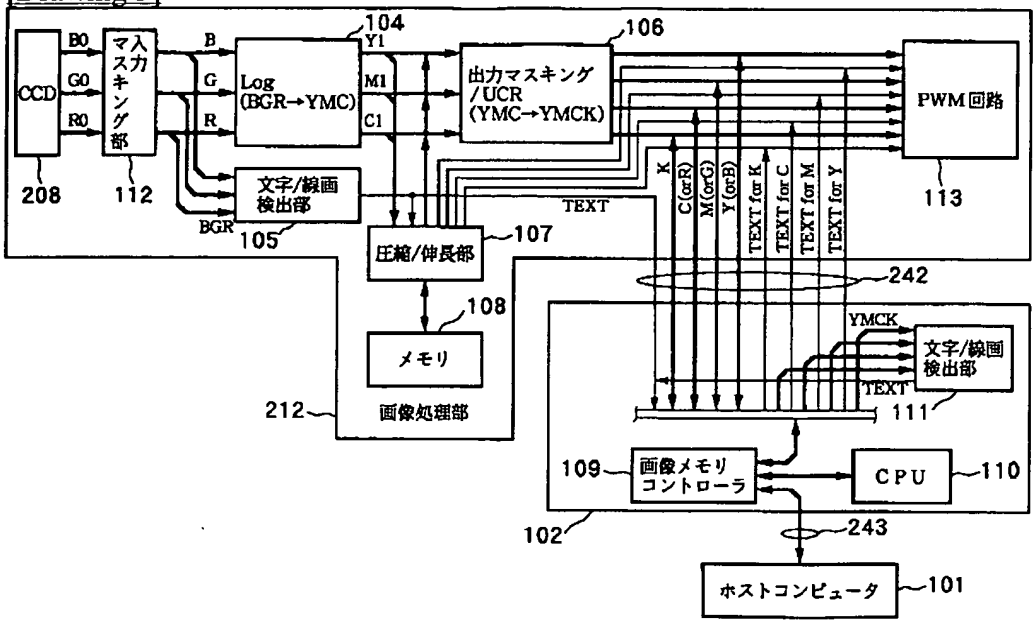
[Drawing 4]



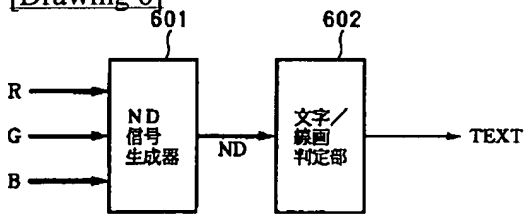
[Drawing 2]



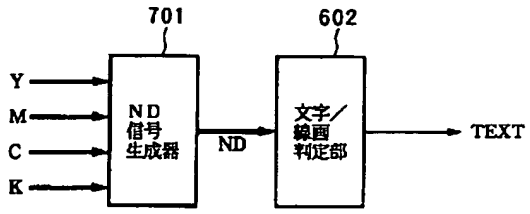
[Drawing 3]



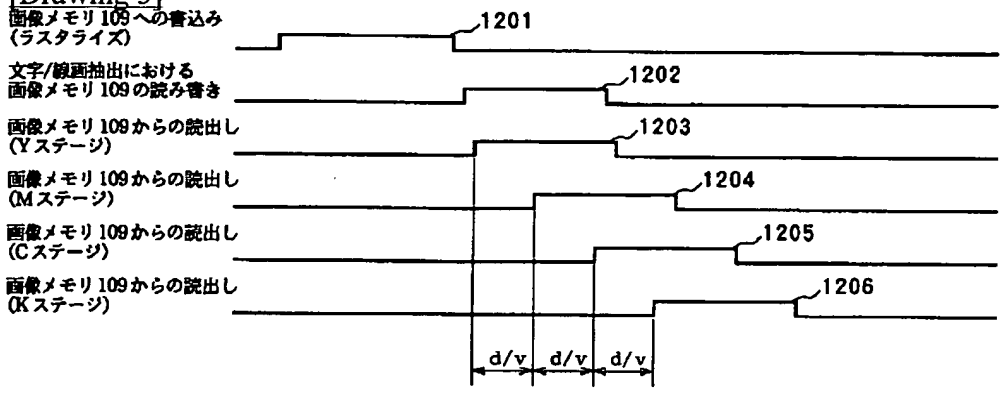
[Drawing 6]



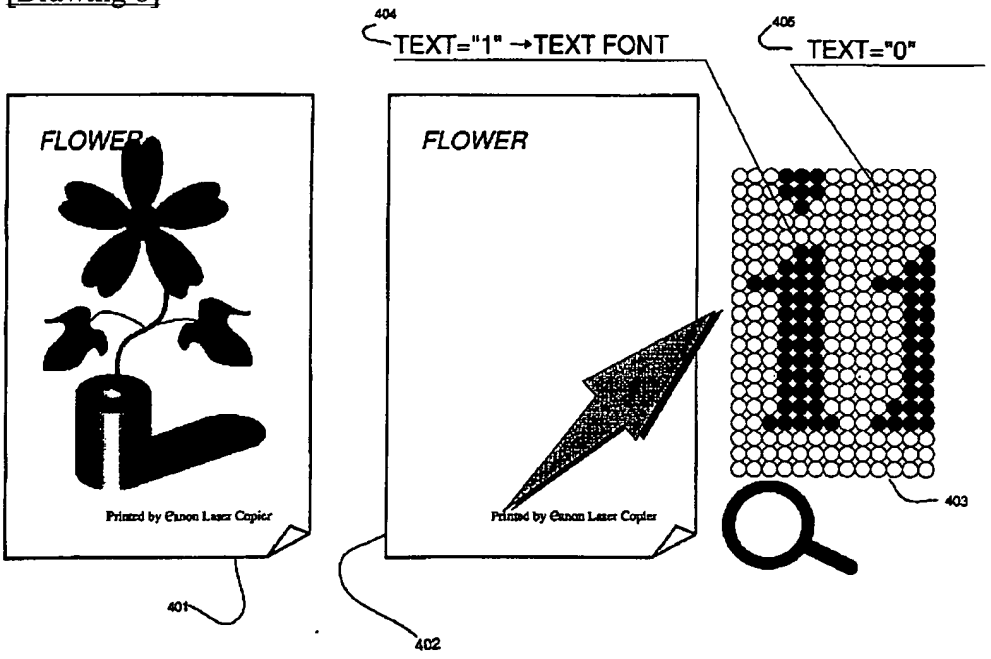
[Drawing 7]



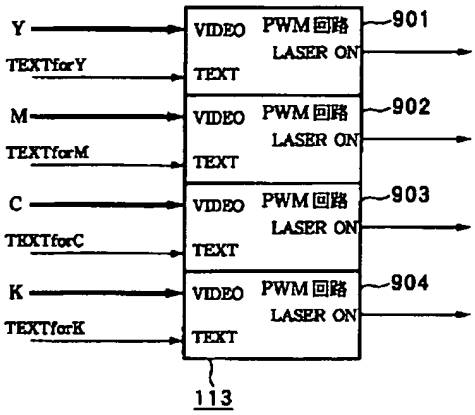
[Drawing 5]



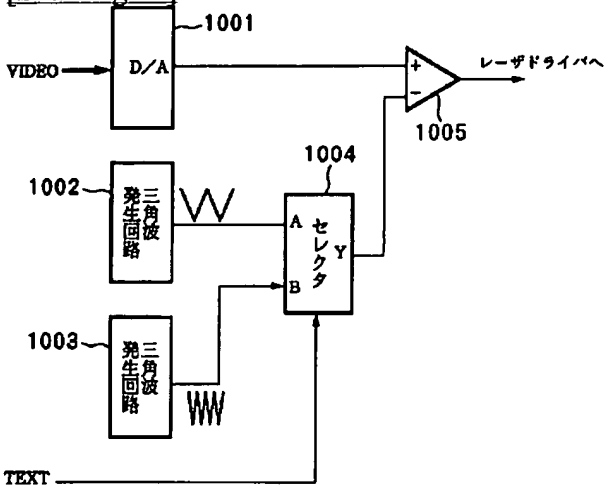
[Drawing 8]



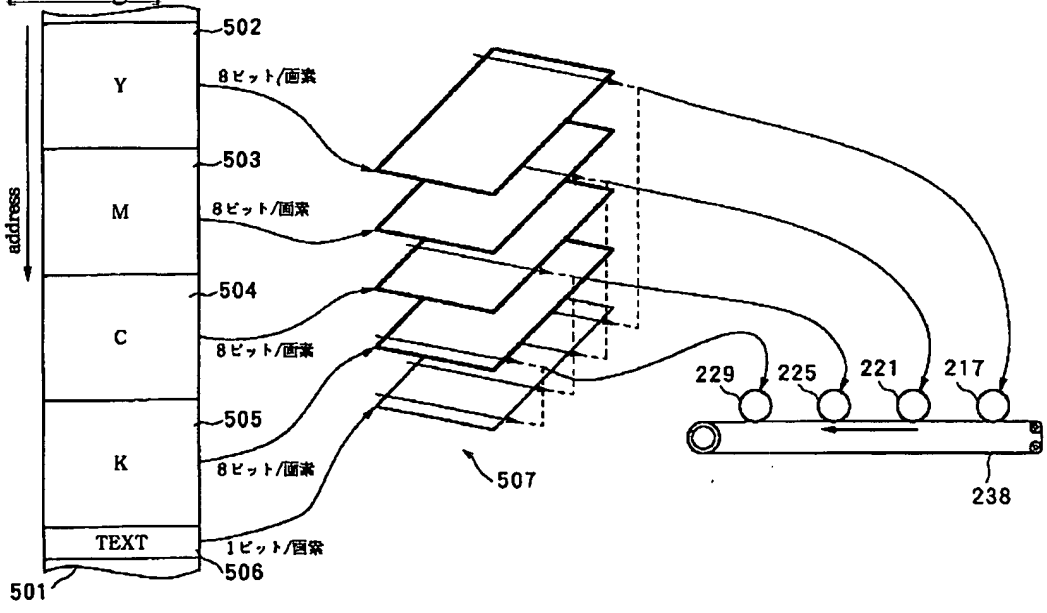
[Drawing 10]



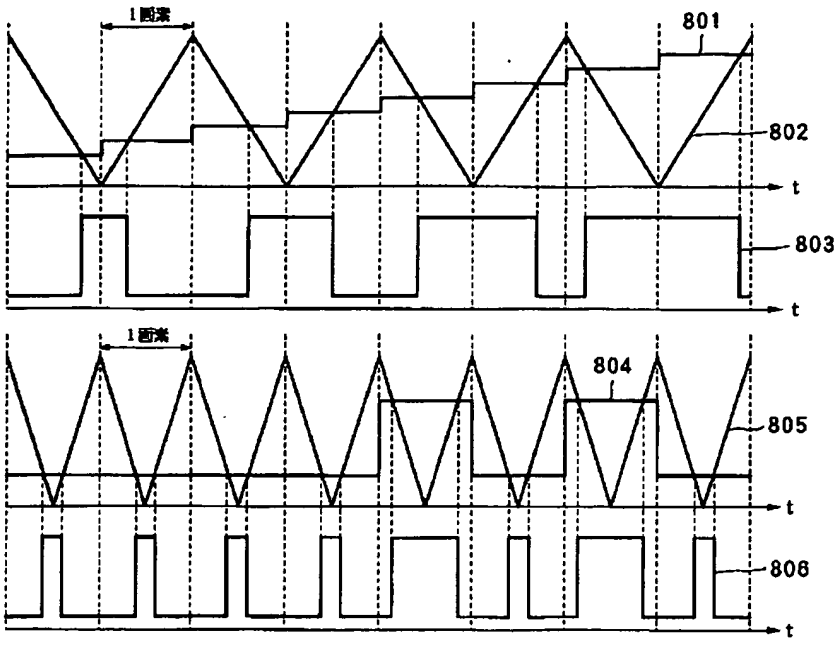
[Drawing 11]



[Drawing 9]



[Drawing 12]



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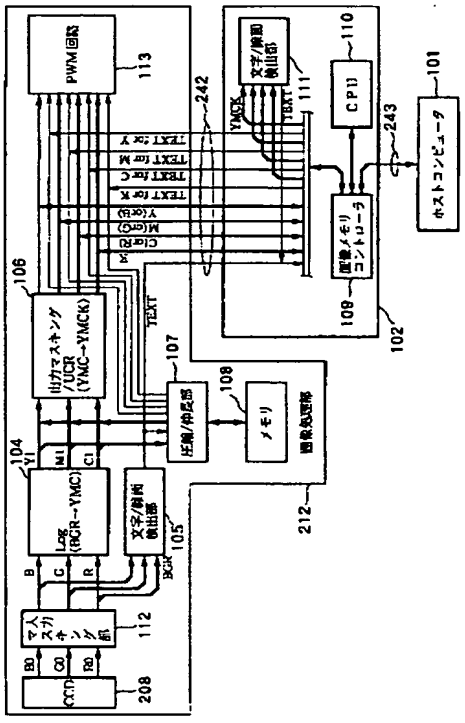
(54)【発明の名称】　画像処理装置およびその方法

(57)【要約】

【課題】　外部機器から入力された画像については、適応処理を行わないため、出力画像の階調性と解像度は画像全面において固定であり、階調性を重視した場合は文字/線画部分の解像度が低くなり、解像度を重視した場合は階調部分の階調性が低くならざるを得ない。

【解決手段】　ホストコンピュータ101から画像信号が入力された場合、文字/線画検出部111は、画像メモリ109からその画像信号を読出し、その画素毎に文字/線画部を構成する画素か否かを表す判定信号TEXTを発生して、画像メモリ109へ格納する。PWM回路113は、画像メモリ109から画像信号とその判定信号TEXTとを読出して、判定信号TEXTに基づいて、画像信号をPWM線数を変更する。



【特許請求の範囲】
【請求項１】　入力されたカラー画像信号を保持する記憶手段と、
前記記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成手段と、
前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出手段と、
前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力手段とを有することを特徴とする画像処理装置。
【請求項２】　入力されたカラー画像信号を保持する記憶手段と、
前記カラー画像信号が外部機器から入力された場合、前記記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成手段と、
前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出手段と、
前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力手段とを有することを特徴とする画像処理装置。
【請求項３】　さらに、前記出力手段より出力された特徴信号に基づいて、出力されたカラー画像信号を記録信号に変換する変換手段を有することを特徴とする請求項1または請求項2に記載された画像処理装置。
【請求項４】　前記変換手段は、前記特徴信号に基づいて、前記カラー画像信号を、解像度を重視した記録信号または階調性を重視した記録信号に変換することを特徴とする請求項1から請求項3の何れかに記載された画像処理装置。
【請求項５】　前記特徴信号は各画素が文字/線画を構成するか否かを表すことを特徴とする請求項1から請求項3の何れかに記載された画像処理装置。
【請求項６】　前記変換手段は、前記特徴信号に基づいて、前記文字/線画を構成する画素のカラー画像信号は解像度を重視した記録信号に変換し、前記文字/線画以外を構成する画素のカラー画像信号は階調性を重視した記録信号に変換することを特徴とする請求項5に記載された画像処理装置。
【請求項７】　入力されたカラー画像信号を保持する記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成ステップと、
前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出ステップと、
前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力ステップと有することを特徴とする画像処理方法。
【請求項８】　カラー画像信号が外部機器から入力された場合、そのカラー画像信号を保持する記憶手段からそのカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成ステップと、
前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出ステップと、
前記記憶手段から画像信号とその特徴信号とを読出して出力する出力ステップとを有することを特徴とする画像処理方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は画像処理装置およびその方法に関し、例えば、複写機としてもプリンタとしても動作する画像処理システムの画像処理装置およびその方法に関するものである。
【０００２】
【従来の技術】画像を読取り画像信号に変換する画像読取手段と、得られた画像信号を保持するメモリ手段と、保持された画像信号を出力する画像出力部とからなる、カラー複写機として動作する画像形成装置を、本出願人は提案している。
【０００３】さらに、コントローラを介して、上記の画像形成装置とホストコンピュータとを接続し、ホストコンピュータで作成されたカラー画像をコントローラによってラスタ化し、コントローラ内部のメモリに保持した後、画像形成装置で出力する、カラープリンタとして動作するシステムも、本出願人は提案している。このシステムは、操作者の指示に基づいて、カラー複写機としてもカラープリンタとしても動作する。
【０００４】さらに、プラテン上に置かれた原稿をコピー出力する際は、文字および線画部分を認識して、これらを高解像度で再現し、それら以外の部分は解像度よりも階調性を重視した再現を適応的に行う複写機を、本出願人は提案している。
【０００５】
【発明が解決しようとする課題】しかし、上述した技術においては、次のような問題点がある。つまり、上述した装置やシステムにおいては、コンピュータなどの外部機器から入力された画像については、前述したような適応処理を行わないため、出力画像の階調性と解像度は画像全面において固定であり、階調性を重視した場合は文字/線画部分の解像度が低くなり、解像度を重視した場合は階調部分の階調性が低くならざるを得ない。
【０００６】本発明は、上述の問題を解決するためのものであり、外部機器から入力された画像の特徴を認識して、その特徴に応じて適応的に画像を出力することがで

きる画像処理装置およびその方法を提供することを目的とする。

【０００７】

【課題を解決するための手段】本発明は、前記の目的を達成する一手段として、以下の構成を備える。

【０００８】本発明にかかる画像処理装置は、入力されたカラー画像信号を保持する記憶手段と、前記記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成手段と、前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出手段と、前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力手段とを有することを特徴とする。

【０００９】また、入力されたカラー画像信号を保持する記憶手段と、前記カラー画像信号が外部機器から入力された場合、前記記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成手段と、前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出手段と、前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力手段とを有することを特徴とする。

【００１０】本発明にかかる画像処理方法は、入力されたカラー画像信号を保持する記憶手段からカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成ステップと、前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出ステップと、前記記憶手段からカラー画像信号とその特徴信号とを読出して出力する出力ステップと有することを特徴とする。

【００１１】また、カラー画像信号が外部機器から入力された場合、そのカラー画像信号を保持する記憶手段からそのカラー画像信号を読出し、そのカラー画像信号を構成する複数の色成分信号から単色信号を生成する単色信号生成ステップと、前記単色信号から前記カラー画像の画素ごとの特徴を表す特徴信号を発生して、前記記憶手段に格納する特徴検出ステップと、前記記憶手段から画像信号とその特徴信号とを読出して出力する出力ステップとを有することを特徴とする。

【００１２】

【発明の実施の形態】以下、本発明にかかる一実施形態の画像処理装置を図面を参照して詳細に説明する。以下では、好ましい実施形態として、フルカラー複写機システムについて、詳細に説明するが、本発明はこの実施形態に限るものではない。

【００１３】［装置概要］図1は本発明にかかる一実施形態のフルカラー複写機システムの概観図で、101はホストコンピュータ、102はコントローラ、103はリーダ部とプリンタ部を有する画像形成装置である。

【００１４】画像形成装置103は、原稿台上に置かれた原稿画像をカラー複写するとともに、コントローラ102を経てコンピュータ101から送られてくるカラー画像を出力する。ここで、ホストコンピュータ101上では、所謂DTP(Desk Top Publishing)のアプリケーションソフトウェアが動作し、各種文書や図形が作成または編集される。ホストコンピュータ101は、作成された文書や図形を、例えばAdobe社のPostScriptのようなページ記述言語(PDL: Page Discription Language)で記述されたデータに変換し、接続ケーブル243を通してコントローラ102へ送る。コントローラ102は、ホストコンピュータ102より送られてきたPDLデータを翻訳し、画素毎の画像信号にラスタ化する。ラスタ化された画像信号は、接続ケーブル242を通して画像形成装置103にて送られ、画像が出力される。

【００１５】ここで、ホストコンピュータ101、コントローラ102、画像形成装置103は、相互に、双方向に、データ通信を行うことが可能である。

【００１６】［画像形成装置概観］図2は画像形成装置103の概観図である。

【００１７】●複写機として原稿画像を複写する場合原稿台ガラス201上に置かれた原稿202は照明203により照射される。原稿202からの反射光は、ミラー204,205,206を経て、光学系207によりCCDセンサ208上に結像する。さらに、モータ209により、ミラー204と照明203を含む第一のミラーユニット210は、速度Vで機械的に駆動され、ミラー205,206を含む第二のミラーユニット211は、速度1/2Vで駆動されて、原稿202の全面が走査される。

【００１８】画像処理部212は、CCDセンサ208から出力された画像情報を電気信号として処理して、後述する画像メモリ109上に一旦保持し、プリント信号として出力する。画像処理部212より出力されたプリント信号は、不図示のレーザドライバに送られ、不図示の四つの半導体レーザを駆動する。四つの半導体レーザで発光されたレーザ光の一つは、ポリゴンミラー213によって走査され、ミラー214,215,216を経て感光ドラム217上に潜像を形成する。他のレーザ光もそれぞれ、ポリゴンミラー213によって走査され、ミラー218,219,220を経て感光ドラム221上に潜像を形成し、ミラー222,223,224を経て感光ドラム225上に潜像を形成し、ミラー226,227,228を経て感光ドラム229上に潜像を形成する。

【００１９】このようにして、各感光ドラム上に形成された潜像はそれぞれ、イエロー(Y)のトナーを供給する現像器230、マゼンタ(M)のトナーを供給する現像器231、シアン(C)のトナーを供給する現像器232、ブラック(K)のトナーを供給する現像器233によって現像される。現像された四色のトナー像は、記録紙に転写され、フルカラーの出力画像を得ることができる。

【００２０】記録紙カセット234,235または手差しトレイ236の何れかから供給された記録紙は、レジストローラ237を経て、転写ベルト238に吸着され搬送される。感光ドラム217,221,225,229上には、給紙タイミングと同期がとられて、予め各色のトナー像が現像されていて、記録紙の搬送とともにトナー像が記録紙へ転写される。四色のトナー像が転写された記録紙は、搬送ベルト238から分離され、搬送ベルト239により搬送され、定着器240によりトナーが定着され、排紙トレイ241へ排出される。

【００２１】なお、四つの感光ドラムは、距離dをおいて等間隔に配置され、搬送ベルト238により、記録紙は一定速度Vで搬送されるので、これにタイミング同期をとって四つの半導体レーザは駆動される。

【００２２】●ホストコンピュータ101から送られてくる画像を出力する場合

ホストコンピュータ101から出力された画像は、コントローラ102を介し、インタフェイスケーブル242を通して、画像メモリ109に直接転送された後、複写機動作の場合と同様に画像が形成される。

【００２３】［画像信号の流れ］図3は画像信号の流れを示すブロック図である。

【００２４】●画像処理部212

CCDセンサ208により、対象画像を表すレッド(R)，グリーン(G)，ブルー(B)の三つの色成分の画像信号に変換され、それぞれディジタル信号として出力される。

【００２５】112は入力マスキング部で、次式に示す演算により、入力されたRGOGOBO信号を標準的なRGB色空間の信号に変換する。ただし、次式のcij(i=1,2,3 j=1,2,3)は、CCDセンサ208の感度特性や照明203のスペクトル特性などの諸特性を考慮した装置固有の定数である。

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} c11 & c12 & c13 \\ c21 & c22 & c23 \\ c31 & c32 & c33 \end{bmatrix} \begin{bmatrix} R0 \\ G0 \\ B0 \end{bmatrix} \quad \cdots(1)$$

【００２６】104は輝度/濃度変換部で、RAMもしくはROMのルックアップテーブルにより構成され、次式に示す演算を行う。

$$C1 = -K \cdot \log(R/255)$$
$$M1 = -K \cdot \log(G/255) \quad \cdots(2)$$
$$Y1 = -K \cdot \log(B/255)$$

ただし、Kは定数、logの底は10

【００２７】106は出力マスキング/UCR部で、次式に示す演算により、M1C1Y1信号を画像形成装置103のトナー色であるYMCK信号に変換する。ただし、次式のaij(i=1,2,3,4j=1,2,3,4)は、トナーの色味特性を考慮した装置固有の定数である。

$$\begin{bmatrix} C \\ M \\ Y \\ K \end{bmatrix} = \begin{bmatrix} a11 & a21 & a31 & a41 \\ a12 & a22 & a32 & a42 \\ a13 & a23 & a33 & a43 \\ a14 & a24 & a34 & a44 \end{bmatrix} \begin{bmatrix} C1 \\ M1 \\ Y1 \\ K1 \end{bmatrix} \quad \cdots(3)$$

ただし、$K1 = \min(C1, M1, Y1)$ …(4)

【００２８】上記の(1)から(4)式により、CCDセンサ208から出力されたRGOGOBO信号は、トナーの分光分布特性に対応したYMCK信号に変換され出力される。

【００２９】一方、105は文字/線画検出部で、原稿画像中の各画素が、文字または線画の一部であるか否かを判定し、判定信号TEXTを発生する。107は圧縮/伸長部で、C1Y1M1画像信号および判定信号TEXTを圧縮して情報量を落とした後、メモリ108に格納するとともに、メモリ108より読出したデータ伸長して、C1Y1M1画像信号および判定信号TEXTを再生する。

【００３０】●コントローラ102

110はCPUで、図示しないプログラムROMなどに格納されたプログラムに基づいて、コントローラ102全体を制御するとともに、図示しないRAMやバッファを用いてPDLデータの展開などを行う。

【００３１】109は画像メモリで、ケーブル242を通して、上記したトナーの分光分布特性にあったYMCK信号が格納され、複写機側の画像形成タイミングに同期して読出され、前述した半導体レーザを駆動するためのPWM信号を形成する後述するPWM回路113へ送られる。また、画像メモリ109は、上記のYMCK信号を保持するだけでなく、ホストコンピュータ101から出力されたRGB信号や、入力マスキング部112から出力されたRGB信号（この場合、輝度/濃度変換部104と出力マスキング/UCR部106には入力信号をそのまま（スルーで）出力するパラメータがセットされる）なども保持する場合がある。

【００３２】111は文字/線画検出部で、その詳細は後述する。

【００３３】［複写機動作］本実施形態のシステムには、複写機単体での動作（以下「複写機動作」という）と、コントローラ102を含む「システム動作」の両方が存在するが、まず、複写機動作を説明する。

【００３４】複写機動作の場合、CCDセンサ208から出力された画像信号は、入力マスキング部112と輝度/濃度変換部104を経て、圧縮/伸長部107により圧縮された後、メモリ108に書込まれるとともに、文字/線画判定部105

から出力された判定信号TEXTも、圧縮/伸長部107により圧縮された後、メモリ108に書込まれる。そして、メモリ108から読出されたデータは、圧縮/伸長部107によって伸長され、複写機の画像形成タイミングに同期して、後述するPWM回路113を通してレーザドライバへ送られる。図4はこの複写機動作のタイミング例を示す図である。

【００３５】図4において、画像信号は、符号1101で示すタイミングでメモリ108に書込まれ、符号1102～1105で示すタイミングで読出される。符号1102～1105で示すタイミングの関係は、図に示すように、それぞれ時間d/Vの読出し開始間隔をもっている。ここで、前述したように、dは等間隔に配置された四つの感光ドラムの間隔であり、Vは搬送ベルト238の搬送速度である。また、符号1102で示すYステージの読出し開始タイミングは、符号1101で示す書込み開始タイミングよりも後になることは言うまでもない。

【００３６】［システム動作］システム動作は、スキャン動作，PDL展開動作，文字/線画抽出動作，プリントアウト動作に大きく別けられる。

【００３７】●スキャン動作

原稿を読取った画像信号をコントローラ102に取込む動作であり、画像メモリ109にはRGBデータもしくはYMCKデータが保持される。RGBデータを読込む場合は、上述したように、輝度/濃度変換部104と出力マスキング/UCR部106とがスルーになる。このようにして、RGBデータとYMCKデータを共通ラインで取込むことができる。

【００３８】●PDL展開動作

ホストコンピュータ101から入力されたPDLデータをフルカラー画像に展開して、画像メモリ109に書込む動作である。このフルカラー画像は、画像形成装置103のもつ出力特性（濃度特性，色再現特性）に合わせて、YMCKの四色に色分解された画像データとして展開される。

【００３９】●文字/線画抽出動作

展開されて画像メモリ109に書込まれたフルカラー画像データを読出し、そのフルカラー画像の各部分について、文字/線画部であるか否かを判定する動作である。文字/線画検出部111は、画像メモリ109から読出したフルカラー画像の各部分が文字/線画部であるか否かを示し、その判定結果を示す判定信号TEXTを画像メモリ109上に書込む。

【００４０】●プリントアウト動作

画像メモリ109に記憶されたフルカラー画像データと判定信号TEXTを、四つの感光ドラムの回転に同期して読出し、後述するPWM回路113へ送る動作で、画像が出力される。

【００４１】●動作タイミング

図5はこのシステム動作のタイミング例を示す図で、符号1201で示す区間においてスキャン動作またはPDL展開動作が行われ、同時に、画像メモリ109への書込動作が行われる。画像メモリ109に書込まれた画像データは、符号1202で示す区間において文字/線画抽出されると同時に、符号1203～1206で示すタイミングで読出される。符号1203～1206で示すタイミングの関係は、図に示すように、それぞれ時間d/Vの読出し開始間隔をもっている。

【００４２】ここで、特徴的なことは、文字/線画検出部111による判定信号TEXTの発生と、発生された判定信号TEXTを画像メモリ109へ記録する動作と、フルカラー画像データおよびその判定信号TEXTの読出しとが同時（並行して）に行われることであり、これらの動作を順次行う場合に比べて処理を高速化することができる。なお、これらの動作の同時処理制御はCPU110によって行われる。すなわち、CPU110が、画像メモリ109に対する書込および読出動作を、時分割に行うことによって実現することができる。

【００４３】［文字/線画判定部］図6は文字/線画検出部105の構成例を示すブロック図で、文字/線画検出部105は、原稿を読取ったRGB画像信号から文字および線画部分を抽出し、当該画素が文字または線画部を構成する場合は‘1’に、それ以外は‘0’になる判定信号TEXTを発生する。

【００４４】図6において、601はND信号生成器で、次式に示す積和演算により、フルカラーRGB画像信号から人間の視感度特性を考慮した明度信号であるND信号を生成する。ただし、d1,d2,d3は人間の視感度特性を考慮した定数である。

$$ND = [d1\ d2\ d3] \begin{bmatrix} R \\ G \\ B \end{bmatrix} \quad \cdots(5)$$

【００４５】602は文字/線画判定部で、明度信号NDから文字/線画部分を抽出し、当該画素が文字または線画部を構成する場合は‘1’を、それ以外は‘0’を発生する。なお、この種の回路は公知であるため、その詳細説明は省略する。

【００４６】同様に、図7は文字/線画検出部111の構成例を示すブロック図で、文字/線画検出部111は、YMCK画像信号から文字および線画部分を抽出し、当該画素が文字または線画部を構成する場合は‘1’に、それ以外は‘0’になる判定信号TEXTを発生する。

【００４７】図6において、701はND信号生成器で、次式に示す積和演算により、フルカラーYMCK画像信号から人間の視感度特性を考慮した明度信号であるND信号を近似的に生成する。ただし、e1,e2,e3,e4は人間の視感度特性を考慮した定数である。

$$ND = [e1\ e2\ e3\ e4]\begin{bmatrix}Y\\M\\C\\K\end{bmatrix} \quad \cdots(6)$$

【００４８】また、文字/線画判定部602は、図6に示した文字/線画判定部602と同様である。

【００４９】［判定信号TEXT］図8は判定信号TEXTを説明するための図で、401は読取られる原稿ないしはプリントアウトされる画像の例を示し、402は画像401における判定信号TEXTを二次元的に示す画像である。つまり、画像401における文字/線画部分が画像402に「黒」で示され、それ以外は「白」で示されている。403は画像402の一部分を拡大した画像で、符号404で示す●印の画素は、文字/線画部を構成する画素であり、そのTEXT信号は'1'になる。一方、符号405で示す○印の画素は、文字/線画以外を構成する画素であり、そのTEXT信号は'0'になる。

【００５０】［画像メモリ］図9は画像メモリ109に保持されるデータの構造と読出し方を説明するための図で、501は画像メモリ109におけるアドレスマップの一例を示している。例えば、イエロー(Y)の画像データ502、マゼンタ(M)の画像データ503、シアン(C)の画像データ504、ブラック(K)の画像データ505は、それぞれ一画素に付きSビットの情報を有する。また、判定信号TEXTのデータ506は、一画素に付き1ビットの情報を有する。

【００５１】507は前記の各データがどのように読出されるかを概念的に示している。つまり、Y画像データ502は感光ドラム217の像形成に同期して、M画像データ503は感光ドラム221の像形成に同期して、C画像データ504は感光ドラム225の像形成に同期して、K画像データ505は感光ドラム229の像形成に同期して、それぞれ読出される。さらに、判定信号TEXTのデータ506は、前記四つの感光ドラムすべてに同期して、四系統同時に（並行して）読出される。

【００５２】［PWM回路］図10はPWM回路113の構成例を示すブロック図である。

【００５３】図10において、901はイエロー(Y)用のPWM回路で、イエロー(Y)のディジタル画像信号と、それに同期して判定信号TEXTが入力され、イエロー(Y)用の半導体レーザを駆動するレーザドライバへ送るためのアナログ信号を発生する。902はマゼンタ(M)用のPWM回路、903はシアン(C)用のPWM回路、904はブラック(K)用のPWM回路で、それぞれ、その色成分のディジタル画像信号と、それに同期して判定信号TEXTが入力され、半導体レーザを駆動するレーザドライバへ送るためのアナログ信号を発生する。

【００５４】図11は各色成分のPWM回路の構成例を示すブロック図で、色成分に関係なく同一の回路構成である。

【００５５】図11において、1001はD/Aコンバータで、入力されたディジタル画像信号をアナログ画像信号に変換する。1002は階調性を重視する画像用の三角波発生器で、例えば二画素周期の三角波を発生する。1003は解像度を重視する画像用の三角波発生回路で、一画素周期の三角波を発生する。1004はセレクタで、判定信号TEXTに基づいて、周期の異なる二つ三角波の何れかを選択し出力する。つまり、セレクタ1004は、判定信号TEXTに基づいて、PWM線数（解像度）を選択している。1005はコンパレータで、D/Aコンバータ1001から出力されたアナログ画像信号と、セレクタ1004で選択された三角波とを比較する。

【００５６】以上の構成により、文字および線画部においては解像度を重視する一画素周期の三角波とアナログ画像信号とが比較され、一方、文字および線画部以外においては階調性を重視す二画素周期の三角波とアナログ画像信号が比較され、パルス幅変調(PWM)されたパルス信号が出力される。このパルス信号は図示しないレーザドライバへ送られる。

【００５７】なお、階調性を重視する三角波の周期は二画素に限定されるものではなく、画像形成部の解像度との関係で三画素周期や四画素周期などに設定されるものである。

【００５８】図12はPWM回路におけるタイミングチャート例で、同図の上段は階調性を重視した場合のPWMタイミングを示し、D/Aコンバータ1001の出力801と二画素単位の三角波802とが比較され、コンパレータ105からパルス信号803が出力される。一方、同図の下段は解像度を重視した場合のPWMタイミングを示し、D/Aコンバータ1001の出力804と一画素単位の三角波805とが比較され、コンパレータ105からパルス信号806が出力される。

【００５９】実際には、出力する画像の各部分が、解像度を重視する文字/線画部か、階調性を重視する文字/線画以外に部分であるか、を示す判定信号TEXTによって、パルス信号803と806が適応的に切替えられて出力されるので、好ましい画像形成が行われることになる。

【００６０】以上説明したように、原稿から読取った画像またはコンピュータによって生成された画像の何れの場合でも、各画素について文字/線画部を構成する画素か否かを判定して、解像度を重視するか、階調性を重視するかを、各画素毎に適応的に選択することで、文字/線画部分は解像度を重視して、それ以外は階調性を重視した画像出力を行うことができる。

【００６１】

【他の実施形態】本発明は、複数の機器（例えば、ホストコンピュータ，インタフェイス，プリンタ，リーダなど）から構成されるシステムに適用しても、一つの機器（例えば、複写機，ファクシミリ装置など）からなる装置に適用してもよい。

【００６２】また、本発明を達成するソフトウェアのプログラムを記録した記憶媒体を、システムあるいは装置に供給し、そのシステムあるいは装置が記憶媒体に格納されたプログラムを読出し実行することによって、本発明が達成される場合にも適用できることは言うまでもない。プログラムを供給するための記憶媒体としては、例えば、フロッピディスク，ハードディスク，光ディスク，光磁気ディスク，CD-ROM，磁気テープ，不揮発性のメモリカード，ROMなどを用いることができる。

【００６３】また、コントローラ102においては、特徴信号を画像メモリ109に記憶させたが、特徴信号用に別のメモリを設けてもよい。

【００６４】また、特徴信号によって表される画像信号の特徴は、文字/線画に限らず、黒色の文字/線画や、写真/網点といった特徴でもよい。

【００６５】

【発明の効果】以上説明したように、本発明によれば、外部機器から入力された画像の特徴を認識して、その特徴に応じて適応的に画像を出力する画像処理装置およびその方法を提供することができる。

【図面の簡単な説明】

【図１】本発明にかかる一実施形態のフルカラー複写機システムの概観図、

【図２】図1に示す画像形成装置の概観図、

【図３】画像信号の流れを示すブロック図、

【図４】複写機動作におけるタイミング例を示す図、

【図５】システム動作におけるタイミング例を示す図、

【図６】図3に示す文字/線画検出部の構成例を示すブロック図、

【図７】図3に示す文字/線画検出部の構成例を示すブロック図、

【図８】判定信号TEXTを説明するための図、

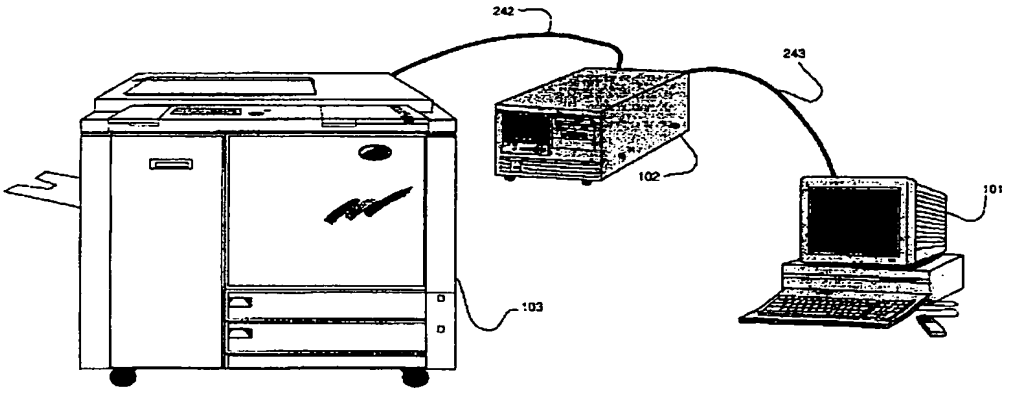
【図９】図3に示す画像メモリに保持されるデータの構造と読出し方を説明するための図、

【図１０】PWM回路の構成例を示すブロック図、

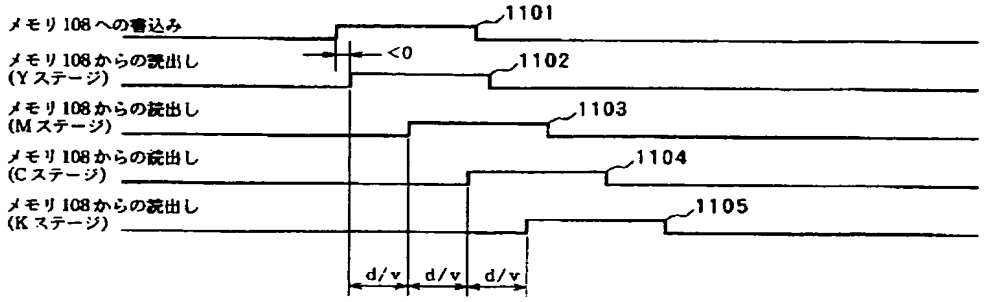
【図１１】各色成分のPWM回路の構成例を示すブロック図、

【図１２】PWM回路におけるタイミングチャート例である。

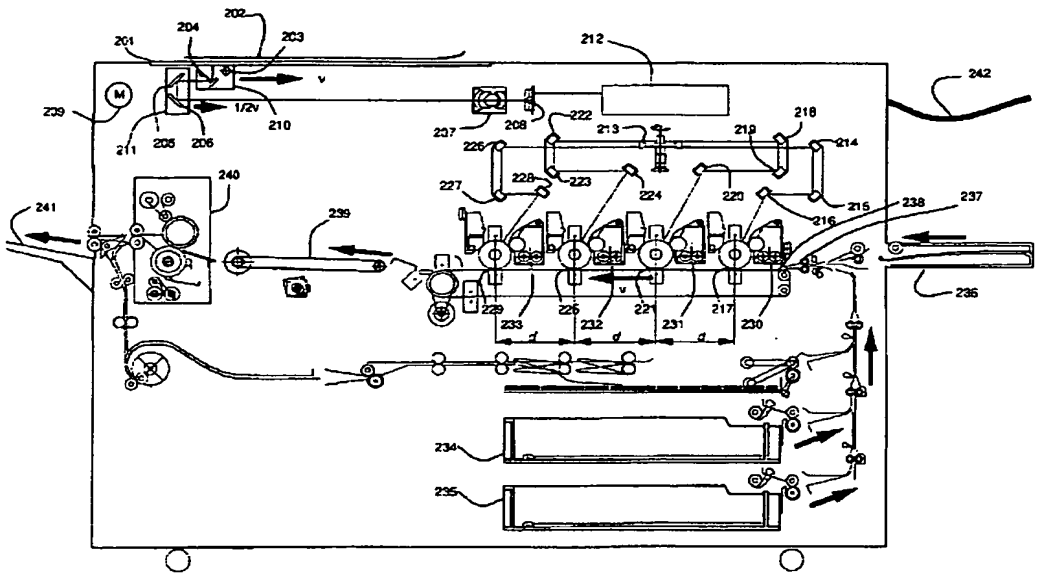
【図１】



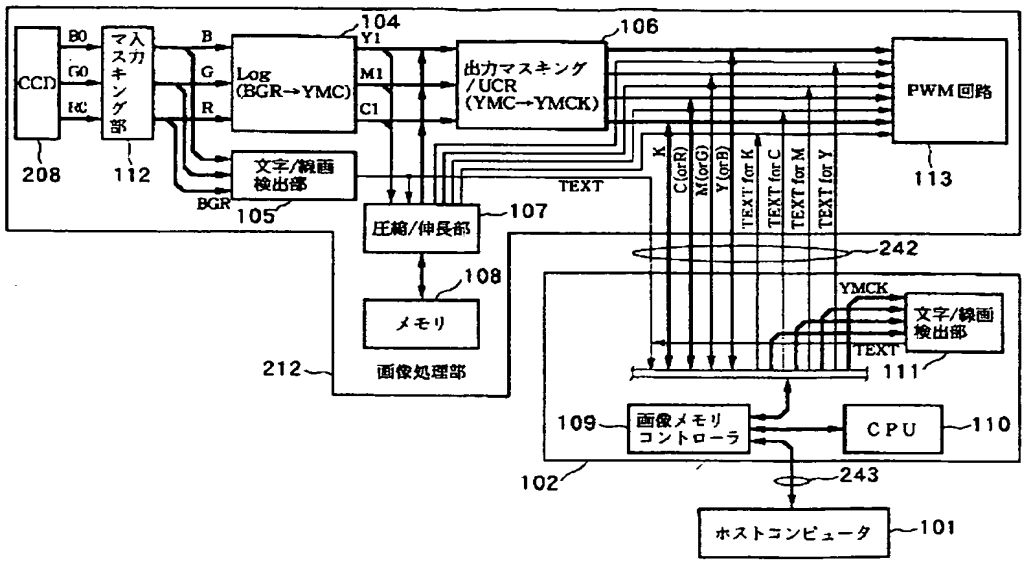
【図４】



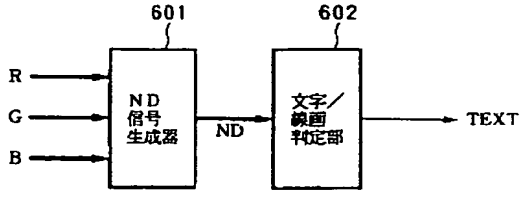
【図2】



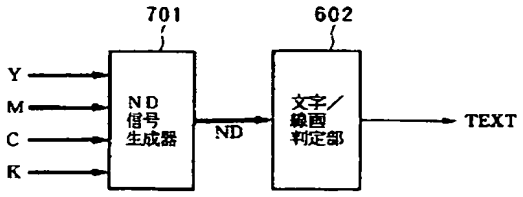
【図3】



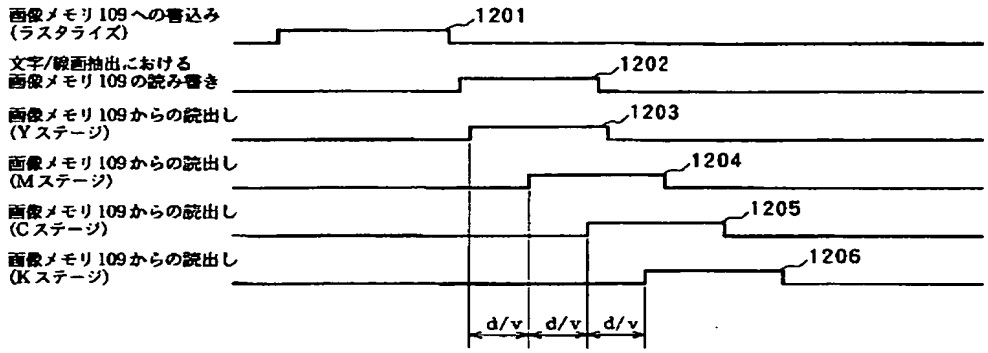
【図6】



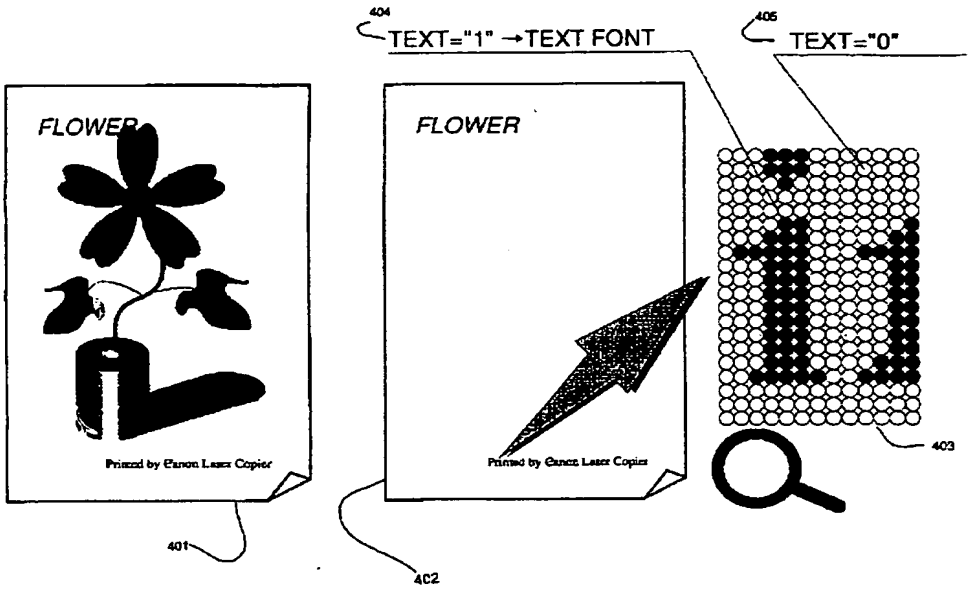
【図7】



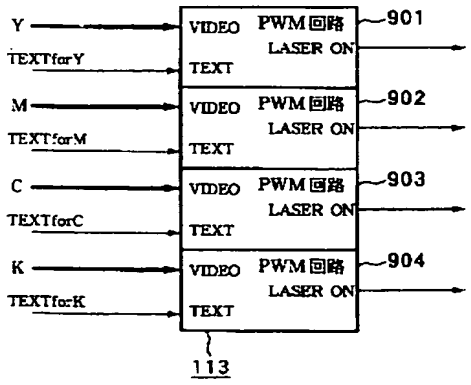
【図5】


画像メモリ109への書込み
(ラスタライズ)
1201
文字/線画抽出における
画像メモリ109の読み書き
1202
画像メモリ109からの読出し
(Yステージ)
1203
画像メモリ109からの読出し
(Mステージ)
1204
画像メモリ109からの読出し
(Cステージ)
1205
画像メモリ109からの読出し
(Kステージ)
1206
d/v
d/v
d/v

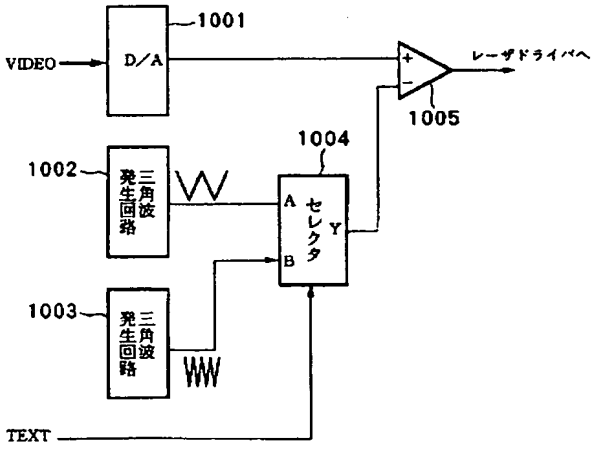
【図8】


404
TEXT="1" →TEXT FONT
405
TEXT="0"
FLOWER
FLOWER
403
401
402

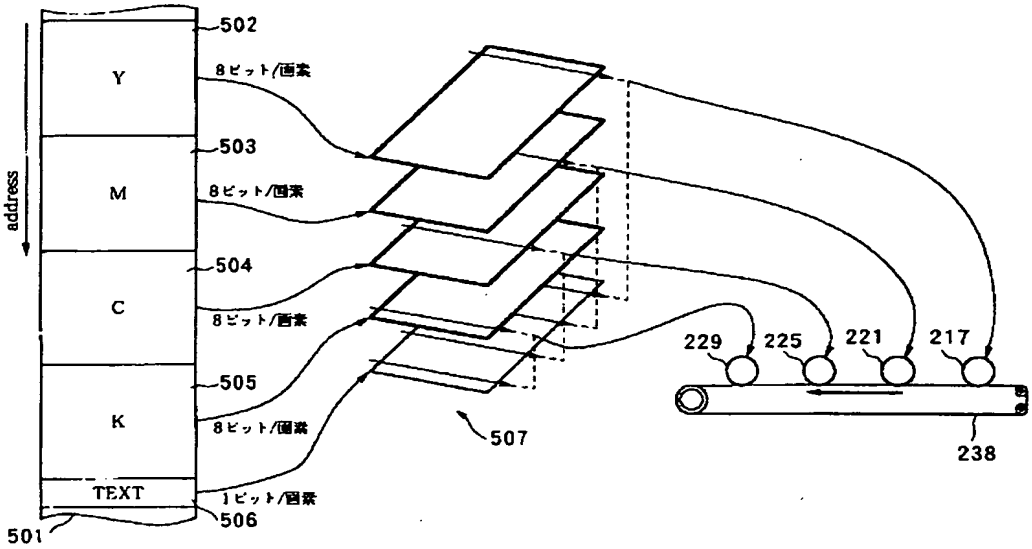
【図10】


Y
TEXTforY
M
TEXTforM
C
TEXTforC
K
TEXTforK
VIDEO
TEXT
PWM回路
LASER ON
901
902
903
904
113

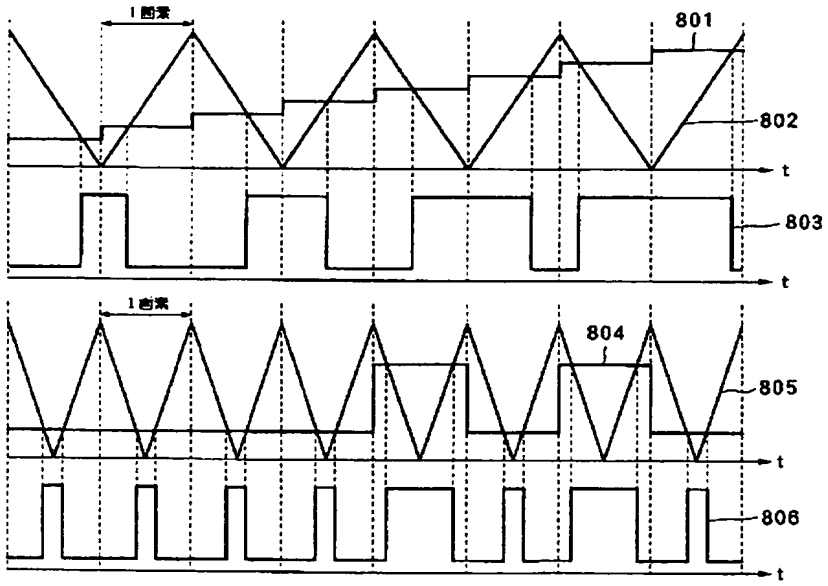
【図11】


VIDEO
D/A
1001
レーザドライバへ
1005
1004
1002
三角波発生回路
A
セレクタ
Y
B
1003
三角波発生回路
TEXT

【図9】



【図12】



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